

# MSMR

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## MEDICAL SURVEILLANCE MONTHLY REPORT

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## Deaths while on active duty in the U.S. Armed Forces, 1990-2008

Many military activities are physically and psychologically demanding; some are inherently dangerous. For this and other reasons, young adults must be physically and psychologically healthy to enter U.S. military service.

While in active service, military members must be able to perform all duties required by their military occupations, ranks, and assignments. To maintain and enhance the health, fitness, and military occupational capabilities of its members, the Services conduct extensive physical fitness, health promotion, safety, and force health protection programs. In addition, service members receive “free” preventive, curative, and rehabilitation medical services.

Because military members are apparently healthy when they enter service and must maintain their health during service, deaths from illnesses are relatively infrequent. However, deaths from injuries (e.g., combat-related, motor vehicle accidents, self-inflicted) are not uncommon.<sup>1-6</sup>

Many deaths of service members are preventable. In order to develop, target, and track the effects of illness and injury prevention policies and practices, it is important to

characterize the numbers, natures, risk factors, and causes of “preventable” deaths among active service members. This report is an overview of mortality among U.S. military members since 1990; it summarizes numbers, rates, trends, and causes of deaths among members of the U.S. Armed Forces from 1990 through 2008.

### Methods:

The surveillance period was 1 January 1990 to 31 December 2008. The surveillance population included all individuals who served on active duty during the surveillance period as a member of the active or reserve component of the U.S. Army, Navy, Air Force, or Marine Corps. Endpoints of interest for this report were deaths of active or reserve component members while serving on active duty.

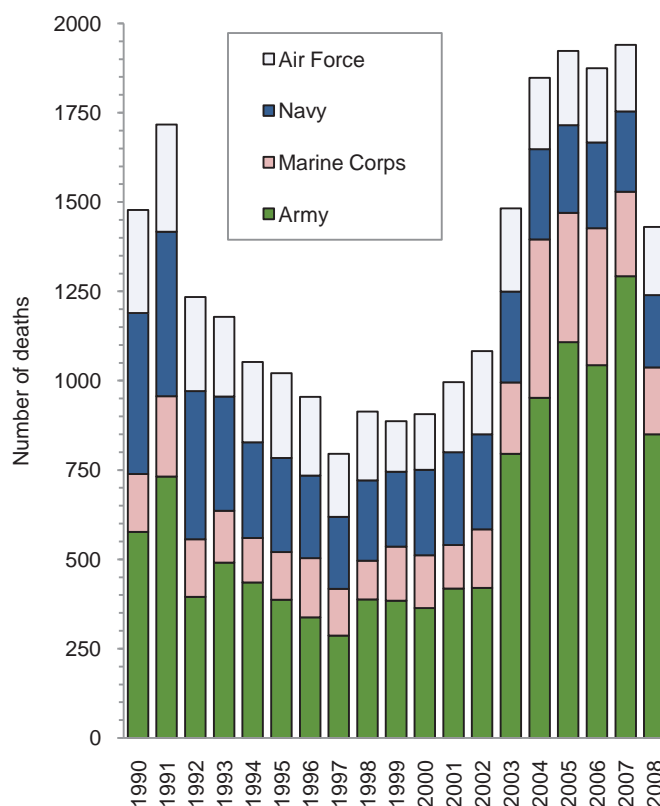
Deaths of active duty service members were ascertained from records produced by service-specific casualty offices and maintained by the Armed Forces Medical Examiner in the DoD Medical Mortality Registry. For surveillance purposes, the records are routinely provided to the Armed Forces

**Table 1.** Demographic and military characteristics of individuals who died in active service, active and reserve components, U.S. Armed Forces, January 1990-December 2008

	Active and reserve components	Active component	
	No.	No.	Rate*
Total	24,715	20,983	72.9
<b>Service</b>			
Army	11,656	9,112	90.5
Navy	5,230	4,875	61.8
Air Force	4,077	3,528	47.4
Marine Corps	3,752	3,468	101.9
<b>Sex</b>			
Male	23,180	19,724	79.0
Female	1,535	1,259	32.9
<b>Race ethnicity</b>			
White, non-hispanic	16,730	13,980	69.2
Black, non-hispanic	4,287	3,785	67.4
Other	3,698	3,218	107.9
<b>Age</b>			
<20	1,895	1,754	78.7
20-24	9,125	8,406	90.0
25-29	4,627	4,141	67.0
30-34	2,968	2,560	55.90
35-39	2,619	2,112	56.08
40+	3,481	2,010	74.3
<b>Military occupation</b>			
Health	1,418	1,217	51.8
Combat	8,092	7,028	119.3
Other	15,205	12,738	61.9

\*Death rate per 100,000 person-years of service

**Figure 1.** Deaths per year among individuals on active duty, by service, all components, U.S. Armed Forces, 1990-2008



Health Surveillance Center for integration in the Defense Medical Surveillance System (DMSS).

The Medical Mortality Registry classifies deaths by “manner” (i.e., natural, accident, homicide, suicide, undetermined) and underlying cause (using a classification system with 457 possible causes). For this report, the 201 underlying causes of service member deaths since 1990 were grouped into 21 cause of death categories.

Summary measures for this analysis are numbers of deaths in the surveillance population overall (i.e., active and reserve component members on active duty) and mortality rates (calculated as deaths per 100,000 person-years of active military service) among members of the active component. Mortality rates were summarized in relation to person-years at risk (rather than individuals at risk) because the U.S. military is a dynamic cohort — every day, many individuals enter and many others leave service. Thus, in a given calendar year, there are many more individuals with any service than there are total person-years of active service; the latter was considered a more consistent measure of exposure to mortality risk across calendar years. Reserve component members were not included in rate calculations because the start and end dates of their active duty service periods were not available.

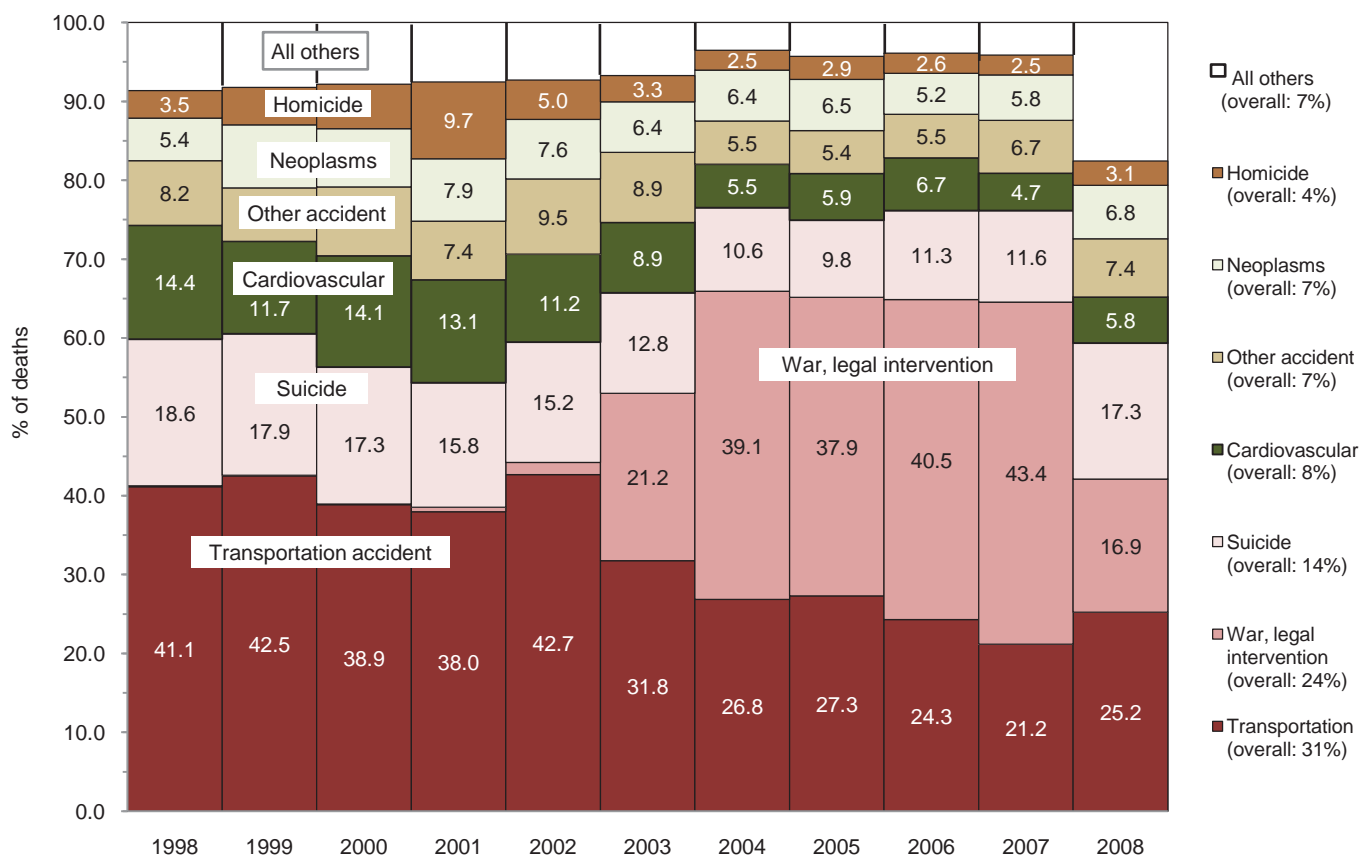
## Results:

During the 19-year surveillance period, there were 24,715 deaths of U.S. military members while on active duty (**Table 1**). The mean number of deaths per year was 1,301; the range was 795 (in 1997) to 1,940 (in 2007). The most deaths occurred in years when major combat operations were ongoing (First Gulf War, 1991; Operations Enduring Freedom, Iraqi Freedom, 2003-2008) (**Figure 1**).

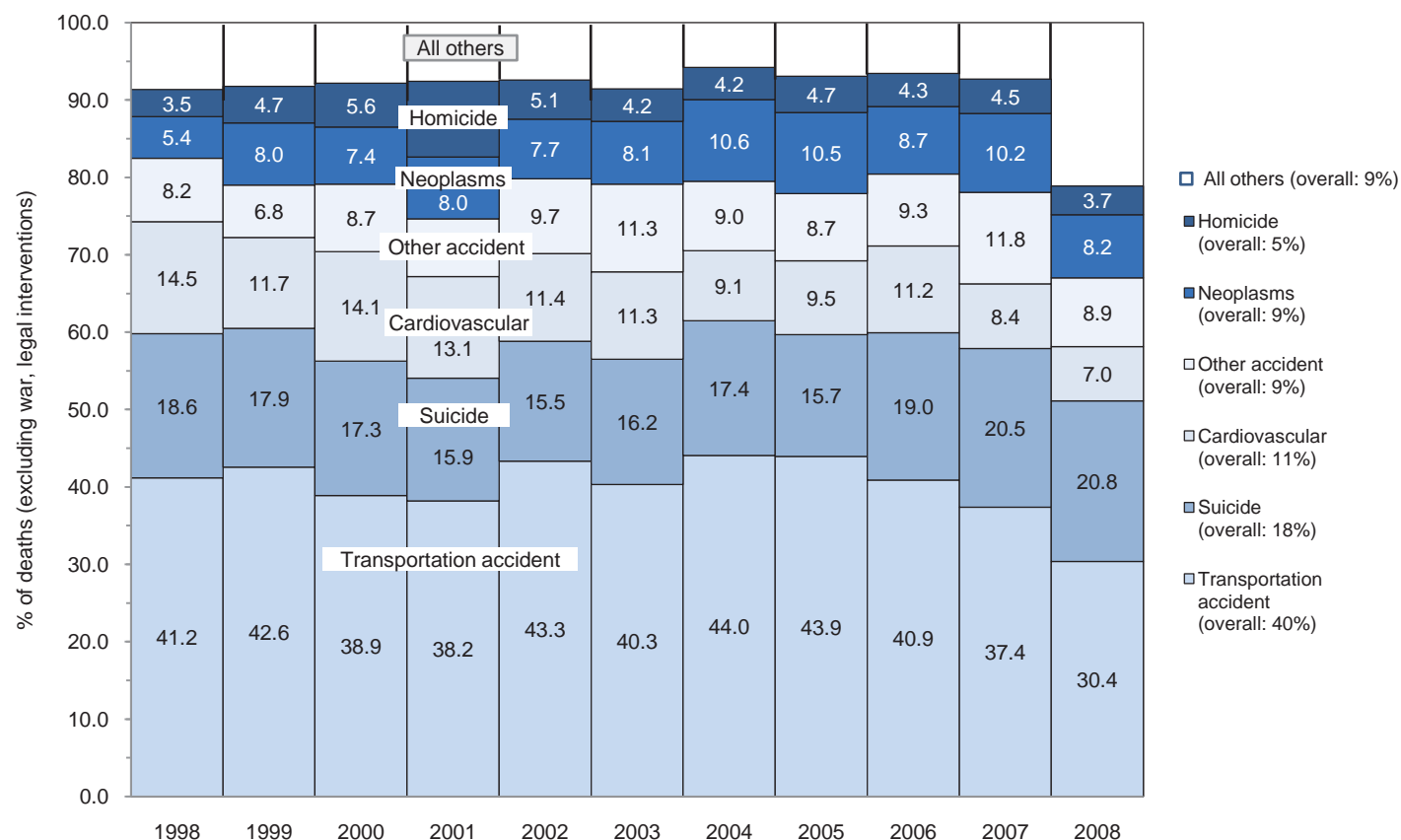
In general, the most deaths were among members of military and demographic subgroups with the largest representations in the military overall. For example, of service members who died while on active duty, most by far (94%) were males, more than two-thirds (68%) were white non-Hispanic, and more than one-half (56%) were in their twenties. Service members with combat-specific occupations accounted for approximately one-third (33%) of all deaths but approximately 20% of all service members (**Table 1**).

From 1998 to 2008, three-fourths of all deaths were caused by accidents, war/legal interventions, or suicides (**Figure 2**). Of deaths unrelated to war/legal interventions, two-thirds were caused by transportation accidents (n=4,665; 40%), other accidents (n=1,068; 9%) or suicides (n=2,065; 18%) (**Figure 3**). Of note, from 2004 to 2007, war-related

**Figure 2.** Deaths of individuals in active service, by proportions attributable to various categories of underlying causes, all components, U.S. Armed Forces, 1998-2008



**Figure 3.** Deaths not related to war/legal interventions, among individuals in active service, by proportions attributable to various categories of underlying causes, all components, U.S. Armed Forces, 1998-2008



injuries accounted for approximately 40% of all deaths of U.S. service members (Figure 2). At the time of this analysis, final determinations of underlying cause of death were still pending for approximately 10% of 2008 deaths. This resulted in a higher proportion of deaths from “all other” causes in 2008 than in prior years.

From 1990 to 2008 among active component members, the crude overall mortality rate was 72.9 per 100,000 person-years (p-yrs). Compared to their respective counterparts, the highest crude overall subgroup-specific mortality rates affected members who were in combat-specific occupations (119.3 per 100,000 p-yrs), in the Marine Corps (101.9 per 100,000 p-yrs), non-white, non-black (107.9 per 100,000 p-yrs), 20-24 years old (90.0 per 100,000 p-yrs), and male (79.0 per 100,000 p-yrs). The lowest crude overall subgroup-specific mortality rates affected members who were female (32.9 per 100,000 p-yrs), in the Air Force (47.4 per 100,000 p-yrs), in health-related occupations (51.8 per 100,000 p-yrs) and in their thirties (56.0 per 100,000 p-yrs) (Table 1).

The highest crude annual subgroup-specific mortality rates affected service members in the Marine Corps in 2004 (233.2 per 100,000 p-yrs), in the Army in 2007 (212.7 per 100,000 p-yrs) and in combat-specific occupations from 2004 to 2007 (range, annual rates, 2004-2007: 212.7-262.4 per 100,000 p-yrs) (data not shown).

Annual mortality rates from deaths unrelated to war were higher during the first two years (1990-1, mean annual

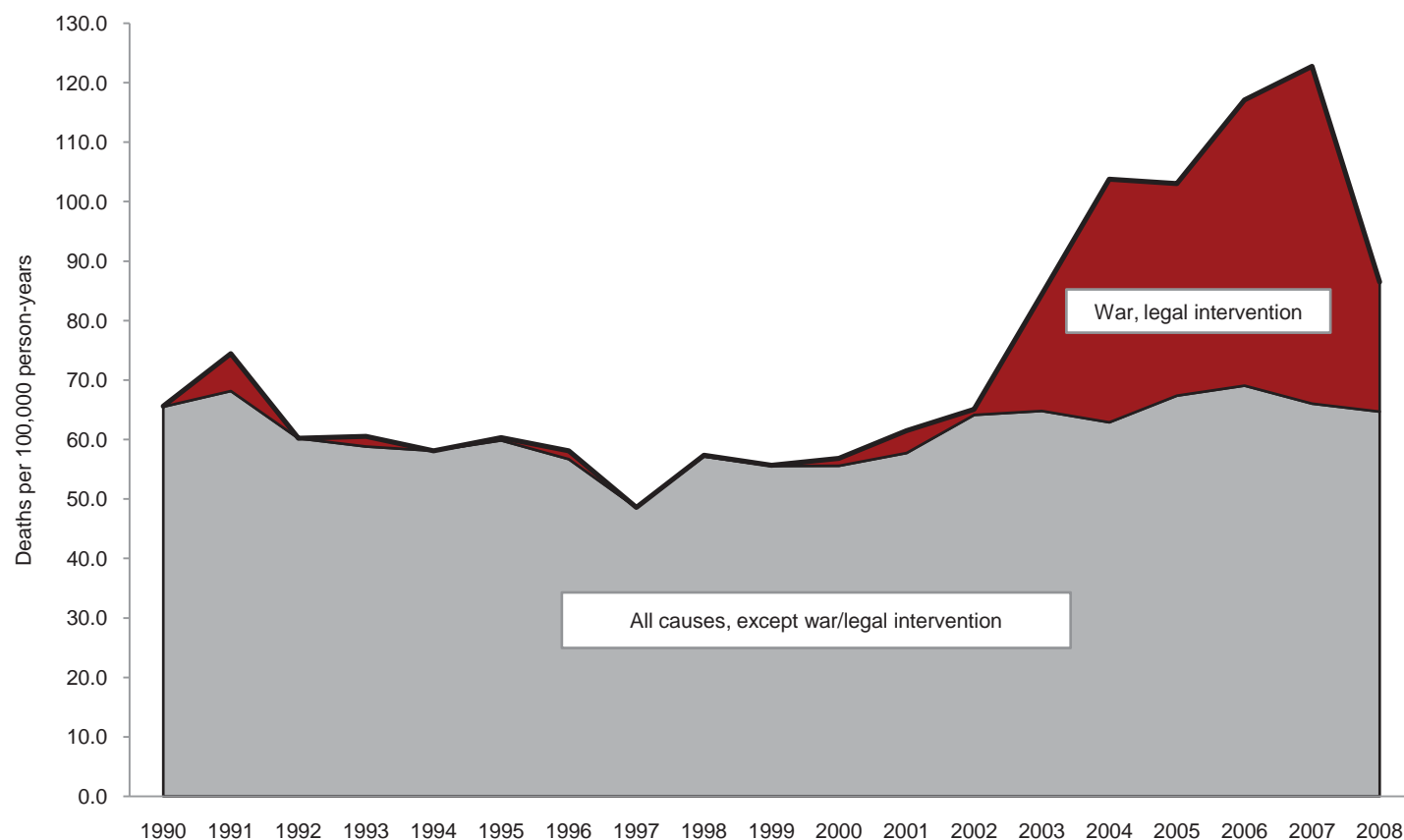
rate: 66.9 per 100,000 p-yrs) and the last seven years (2002-8, mean annual rate: 65.6 per 100,000 p-yrs) than the intervening ten years (1992-2001, mean annual rate: 56.8 per 100,000 p-yrs) of the overall period. In general, however, there was no clear long-term trend in mortality from deaths unrelated to war (Figure 4).

#### Editorial comment:

In the past two decades (which include two periods of intense combat operations), the crude overall mortality rate among U.S. service members was 72.9 per 100,000 person-years. In 2005, in the general U.S. population, the crude overall mortality rate among 15-44 year olds was 127.5 per 100,000 p-yrs.<sup>7</sup> If relevant age-specific mortality rates in the U.S. general population in 2005 had affected the respective age-groups of U.S. military members throughout the period of interest for this report, there would have been approximately 12,141 (58%) more deaths among military members (calculations not shown).

This report documents that, in general, crude mortality rates are lower in active military than similarly aged civilians; however, because of war-related injuries, mortality rates among military members younger than 25 years are higher than the rates among their civilian counterparts. In both military and civilian populations, accidents and suicides are



**Figure 4.** Crude annual mortality rate, by relationship to war/legal interventions, active components, U.S. Armed Forces, 1990-2008

leading causes of death among individuals in their late teens and early twenties.<sup>7</sup> Because military activities (particularly related to combat operations) are often physically dangerous and psychologically stressful, military members may have increased risks of dying from these causes. In 2005, among 15-24 year old civilians, homicide was the second leading cause of deaths, while in the military, since 1998, war-related injuries have been the second leading cause of deaths (and the leading cause each year since 2004).<sup>7</sup>

Among U.S. civilians 25 to 44 years old, malignant neoplasms and diseases of the heart are the second and third leading causes of death (after accidents)<sup>7</sup>; in contrast, there are relatively few disease-related deaths among military members in active service. The finding is not surprising because young adults with life-threatening medical conditions are relatively unlikely to apply for and are medically disqualified from entering military service. Also, active military members who develop life-threatening medical conditions while in service generally leave (e.g., medical disability) prior to the end clinical stages of their illnesses. As a result, rates of disease-related deaths are much lower among actively serving military members than similarly aged civilians.

In summary, excluding war-related deaths, accidents and suicides account for approximately two-thirds of all deaths of active service members. The current focuses of the Services on safety and mental health are clearly indicated not only

to decrease morbidity, disability, and costs and to enhance individual and unit operational effectiveness; they are also indicated to minimize the premature loss of lives of young men and women in military service.<sup>5,6</sup>

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## Alcohol-related medical encounters, active components, U.S. Armed Forces, January 2006 - December 2008

**A**mong U.S. military members, alcohol use is frequently implicated in accidental and intentional injuries, acts of misconduct, and domestic problems.<sup>1,2</sup> Studies have documented the importance of alcohol abuse in relation to service member hospitalizations,<sup>3</sup> the individual risk of separation from service,<sup>4</sup> and as a comorbid condition with posttraumatic stress disorder and depression.<sup>5</sup> During the emotionally charged and potentially stressful adjustment period after deployment, alcohol abuse may be exacerbated.<sup>6</sup>

Alcohol abuse is a public health problem and a personal health concern; in the military, alcohol abuse can affect unit morale, welfare, operational effectiveness, and discipline.<sup>7</sup> In 2009, the Army revised its regulation governing the substance abuse program;<sup>7</sup> there was a recent proposal in Congress to conduct a DoD-wide review of alcohol treatment programs.<sup>8</sup> Recently, Post Deployment Health Assessment and Reassessment questionnaires (DD2796, DD2900) were enhanced to include screens for possible alcohol misuse and to direct the provider to discuss the deployer's drinking behavior if needed.<sup>9</sup>

Recent studies of service members' mental health have estimated the "burdens" (e.g., attrition from service, health care costs) associated with various mental disorders.<sup>10-12</sup> From public health and military policy standpoints, there has been flourishing interest in ensuring access to care and adequate treatment without stigma (e.g., clinic staffing/resource requirements,<sup>13</sup> deployers' attitudes toward care, "referral completion" rates<sup>14</sup>). Finally, electronic data records have allowed investigation of relationships between service members' pre- and postdeployment medical history and their responses on the deployment health assessments (forms DD2795, DD2796, DD2900).<sup>13</sup>

The objectives of this report were to summarize the numbers, natures, and rates (or prevalences, where appropriate) of alcohol-related medical encounters of service members in relation to demographic and military characteristics; document the frequency and nature of follow-up care for acute alcohol-related problems; and quantify the relationship between pre- and postdeployment alcohol-related morbidity.

### Methods:

The surveillance period was 1 January 2006 to 31 December 2008. The surveillance population included all individuals who served in the active component of the U.S. Armed Forces any time during the surveillance period.

Outcomes of interest were ascertained from records of medical encounters that included alcohol abuse-related ICD-9-CM diagnosis codes (in any diagnostic position) and Healthcare Common Procedure Coding System (HCPCS) codes (**Table 1**). The first occurrence of a given diagnosis type (in any diagnostic position) was considered an incident case; if an incident case was documented with a hospitalization and ambulatory visit on the same day, the hospitalization record was used for analysis. Prevalences (per 1,000 service members) were estimated for chronic alcohol-related conditions, substance abuse treatment (defined as three or more visits to a substance abuse clinic), and recurrent acute abuse (defined as three or more acute diagnoses separated from one another by at least 30 days).

To estimate frequencies of apparent follow-up care for service members with acute alcohol abuse-related medical encounters, we estimated the number and percentage of service members with relevant incident encounters who had subsequent encounters at a substance abuse outpatient facility and/or received alcohol treatment or counseling. For this analysis, only incident encounters during the first two years of the surveillance period were considered to allow at least one year of follow-up time.

The relationship between predeployment incidence of acute alcohol diagnoses (within 365 days preceding a deployment that began between 1 July 2007 and 30 June 2008) and postdeployment alcohol-related medical encounters was investigated among deployers who completed a DD2796 and/or DD2900 upon return from deployment. Numbers and proportions of returned deployers who screened positive (endorsement of at least one item) on the two-item conjoint screen (TICS) for alcohol (DD2900 questions 13a-b) or received a provider referral for an alcohol problem (DD2900 page 4, question 4) were estimated.

**Table 1.** Diagnosis and procedure codes related to alcohol abuse used in this analysis

Acute alcohol diagnosis	ICD-9-CM: 303.0, 305.0, 790.3, 980.0, E860
Chronic alcohol diagnosis	ICD-9-CM: 535.3, 535.30, 535.31, 291, 303.9, 357.5, 425.5, 571.0, 571.1, 571.2, 571.3
Substance abuse counseling	ICD-9-CM: V65.42
Alcohol-related procedure	ICD-9-CM: 94.46, 94.53, 94.61, 94.62, 94.63, 94.67, 94.68, 94.69
Alcohol or drug-related procedure	HCPCS: H0001, H0002, H0004, H0005, H0006, H0007, H0008, H0009, H0010, H0011, H0012, H0013, H0014, H0015, H0016, H0017, H0018, H0019, H0050, H2012, H2034, H2035, H2036, T1007, T1010, T1012, T1013, 99408, 99409

## Results:

During the surveillance period, 1,945,667 individuals provided 4,072,637 person-years of service in the active component of the U.S. Armed Forces. Of these individuals during the period, 65,269 (3.4%; crude incidence rate [CIR]: 16.0 per 1,000 person-years [p-yrs]) had at least one acute alcohol-related medical encounter, and 7,188 (0.4%; CIR: 1.8 per 1,000 p-yrs) had at least one acute alcohol-related hospitalization (Table 2).

Relative to their respective counterparts, incidence rates of acute alcohol-related medical encounters were higher among junior enlisted, 21-24-year-old, and male service members; the rate of incident acute alcohol encounters was higher in the Army than the other Services. Relationships were similar regarding incidence rates of acute alcohol-related hospitalizations; however, the male-to-female rate ratio was much smaller for acute alcohol-related hospitalization (male-to-female [m:f] rate ratio: 1.15) than any medical encounter (m:f rate ratio: 1.51).

Among men, the highest rates of each alcohol and substance abuse-related outcome were among 21-24 year olds. Among women, incidence rates of acute alcohol-related hospitalization, alcohol-related medical encounters, and substance abuse clinic encounters were highest among those younger than 21. In the Marine Corps and Navy, rates of

alcohol-related hospitalization were higher among females than males (data not shown).

Overall, one of 150 service members (6.7/1,000) had three or more acute alcohol diagnoses separated by at least 30 days ("recurrent acute diagnosis"). The Army had the highest service-specific rate of incident acute diagnosis as well as the highest prevalence of recurrent acute diagnosis (10.0/1,000). The Air Force had the lowest service-specific rate of incident acute diagnosis but the second highest prevalence of recurrent acute diagnosis (6.1/1,000) (Table 2).

Encounters at substance abuse clinics within one year after incident acute alcohol diagnoses were documented for nearly two-thirds of affected service members in the Army (61%), Air Force (63%), and Navy (62%) — but fewer than one-half (42%) of those in the Marine Corps. Encounters that included counseling or alcohol treatment within one year after incident acute diagnoses were documented for more than one-half of affected members of the Navy (59%) — but relatively fewer of those in the Army (38%), Air Force (38%), and Marine Corps (36%). Many service members received counseling/alcohol treatment as well as care at a substance abuse clinic within one year of an incident encounter for alcohol abuse (Table 3).

Relative to other deployers, those with an acute alcohol diagnosis within one year prior to deploying were more than 2.5 times as likely to endorse at least one item on the

**Table 2.** Numbers and incidence rates per 1,000 person years (or, where appropriate, prevalence per 1,000 service members) of alcohol-related medical events, active component, U.S. Armed Forces, 2006-2008

			Acute alcohol diagnosis		Chronic alcohol diagnosis		Alcohol-related procedure/counseling		Hospitalization with acute diagnosis		Substance abuse clinic encounter		Any alcohol diagnosis or encounter (excluding substance abuse counseling)		Substance abuse treatment (3 or more substance abuse clinic encounters)		Recurrent acute diagnosis (3 or more acute diagnoses 30+ days apart)	
	No.	Person years	No.	Rate/1,000py	No.	Prevalence/1,000 persons	No.	Rate/1,000py	No.	Rate/1,000py	No.	Rate/1,000py	No.	Rate/1,000py	No.	Prevalence/1,000 persons	No.	Prevalence/1,000 persons
Overall	1,945,667	4,072,637	65,269	16.0	38,460	19.8	66,229	16.3	7,188	1.8	105,084	25.8	136,458	33.5	60,789	31.2	13,059	6.7
Sex																		
Female	293,525	585,568	6,526	11.1	3,633	12.4	6,697	11.4	917	1.6	11,019	18.8	15,116	25.8	5,819	19.8	1,354	4.6
Male	1,652,142	3,487,069	58,743	16.8	34,827	21.1	59,532	17.1	6,271	1.8	94,065	27.0	121,342	34.8	54,970	33.3	11,705	7.1
Age																		
<21	567,193	658,498	13,082	19.9	6,139	10.8	14,781	22.4	1,444	2.2	23,753	36.1	29,469	44.8	11,917	21.0	1,911	3.4
21-24	786,307	1,118,728	31,320	28.0	17,730	22.5	29,571	26.4	3,039	2.7	46,969	42.0	60,959	54.5	27,227	34.6	6,134	7.8
25-29	547,174	874,202	14,634	16.7	9,348	17.1	14,726	16.8	1,529	1.7	23,224	26.6	30,582	35.0	12,934	23.6	3,121	5.7
30-34	335,790	571,157	4,807	8.4	3,638	10.8	5,282	9.2	557	1.0	8,529	14.9	11,416	20.0	4,501	13.4	1,006	3.0
35-39	273,862	481,822	2,756	5.7	2,426	8.9	3,124	6.5	390	0.8	5,192	10.8	7,247	15.0	2,634	9.6	587	2.1
40+	197,846	368,231	1,662	4.5	1,727	8.7	1,733	4.7	265	0.7	3,468	9.4	5,088	13.8	1,576	8.0	300	1.5
Service																		
Army	744,906	1,522,642	34,606	22.7	18,413	24.7	30,263	19.9	3,979	2.6	49,906	32.8	65,774	43.2	30,018	40.3	7,448	10.0
Air Force	446,585	997,728	8,565	8.6	4,178	9.4	4,566	4.6	864	0.9	19,113	19.2	22,601	22.7	8,470	19.0	2,741	6.1
Marine Corps	287,383	550,274	9,037	16.4	6,347	22.1	9,880	18.0	1,000	1.8	11,865	21.6	17,497	31.8	7,029	24.5	961	3.3
Navy	471,401	1,001,993	13,068	13.0	9,524	20.2	21,525	21.5	1,345	1.3	24,211	24.2	30,602	30.5	15,272	32.4	1,909	4.0
Grade																		
E1-E4	1,117,730	1,756,127	50,296	28.6	28,552	25.5	50,987	29.0	5,402	3.1	79,710	45.4	101,104	57.6	46,889	42.0	10,133	9.1
E5-E9	784,274	1,650,583	14,271	8.6	9,720	12.4	14,453	8.8	1,588	1.0	23,771	14.4	32,914	19.9	12,461	15.9	2,651	3.4
O/W	281,832	665,928	1,611	2.4	1,068	3.8	1,743	2.6	208	0.3	3,524	5.3	5,025	7.5	1,439	5.1	275	1.0



**Table 3.** Follow-up treatment within 12 months after incident acute alcohol diagnoses, 2006-2007

Service	Acute alcohol dx	Encounter in substance abuse clinic		Encounter with counseling (V code) or drug/alcohol treatment procedure		Either	
		No.	%	No.	%	No.	%
Army	22,487	13,814	61.4	8,567	38.1	14,166	63.0
Air Force	6,036	3,773	62.5	2,295	38.0	4,054	67.2
Marine Corps	5,758	2,408	41.8	2,085	36.2	2,492	43.3
Navy	9,132	5,705	62.5	5,348	58.6	5,930	64.9

post-deployment screen for current or ever alcohol problem (TICS) — the relationships were similar across the services, although the TICS endorsement rates widely varied among them. Of all deployers with a medical encounter for acute alcohol abuse within one year prior to deploying, one-quarter (25.4%) were referred for alcohol problems by providers on post-deployment health assessment forms. Twelve percent of all deployers with no recent alcohol abuse-related encounters also received provider referrals on post-deployment health assessment forms (Table 4).

#### Editorial Comment:

This report documents the frequency with which active component service members show indications of acute alcohol abuse (ever and with recurrence), receipt of treatment for alcohol abuse, and morbidity likely caused by alcohol abuse. Two major patterns emerged. First, incidence rates are lower among older and higher-ranking service members. Undoubtedly, the finding reflects incompatibilities between alcohol abuse, successful performance of military duties (including leadership and mentoring), and military career advancement. There are professional proscriptions against troublesome drinking among officers and senior enlisted leaders; such proscriptions are incentives to drink alcohol in moderation. On the other hand, they may deter officers and enlisted leaders from seeking care or counseling for alcohol and other substance abuse problems. In turn, prevalences and rates of alcohol and other substance abuse problems are likely underestimated from diagnoses and procedures documented on standard medical records — more so among officers and senior enlisted leaders than other military members.

Another major finding is generally higher rates of alcohol abuse-related encounters among male than female service members. In this analysis, among males, the highest rates

**Table 4.** Among deployers with and without acute alcohol diagnoses during the 12 months preceding deployment, number and percent endorsing at least one item on the two-item conjoint screen (TICS) for alcohol abuse and number and percent with provider referrals for an alcohol problem on PDHA or PDHRA, active component service members who deployed between July 2007 and June 2008

	Acute diagnosis within year before deployment	No. of deployers	No. of deployers with a 2008 version PDHA or PDHRA	Endorsing ≥1 TICS item		Provider referral for alcohol problem	
				No.	%	No.	%
Overall	Yes	3,860	2,801	439	15.7	712	25.4
	No	242,405	167,221	9,932	5.9	20,051	12.0
Army	Yes	2,138	1,849	347	18.8	627	33.9
	No	92,108	77,600	6,124	7.9	16,546	21.3
Air Force	Yes	416	349	14	4.0	10	2.9
	No	55,826	46,517	753	1.6	832	1.8
Marine Corps	Yes	589	481	67	13.9	64	13.3
	No	40,728	32,144	2,621	8.2	2,343	7.3
Navy	Yes	717	122	11	9.0	11	9.0
	No	53,743	10,960	434	4.0	330	3.0

of acute alcohol diagnoses were among 21 to 24 year olds (just above the U.S. legal purchase age). Among females, the highest rates of incident acute alcohol abuse-related diagnoses were in the <21 year olds (below the U.S. legal purchase age). In the Navy and Marine Corps, rates of incident acute alcohol-related hospitalizations were higher among females than males overall. The Services should target alcohol and other substance abuse programs to the youngest and most junior female members — beginning in recruit training.

Following incident acute alcohol diagnoses, there were fewer substance abuse clinic encounters among affected members of the Marine Corps than the other services; and there were more medical encounters that included counseling/alcohol treatment among affected members of the Navy than the other Services. The findings may not reflect the actual experiences of service members; for example, medical encounters that include alcohol-related counseling or treatment may be documented differently in different medical treatment facilities and settings.

During the surveillance period, one in eight returning deployers who completed post-deployment health assessments received a provider referral for alcohol problems; the minority of service members with a predeployment history of acute alcohol diagnoses were twice as likely as their counterparts to be referred for an alcohol problem post-deployment. Further analyses are indicated to determine if returning service members referred for alcohol problems post-deployment receive appropriate counseling/treatment — or if they have different alcohol abuse-related experiences post-deployment compared to other returning deployers.

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## Preliminary Report: Febrile Acute Respiratory Disease Caused by Adenovirus Type 14, U.S. Coast Guard Training Center, Cape May, New Jersey, March 2009

During the first half of March 2009, a sharp increase in the weekly numbers of febrile acute respiratory disease (FRI) cases occurred among trainees at the United States Coast Guard (USCG) Training Center (TRACEN), in Cape May, New Jersey. Since July 1999, TRACEN has regularly collected specimens from trainees with febrile acute respiratory illnesses in support of the FRI Surveillance Among U.S. Military Trainees program sponsored by the Department of Defense Global Emerging Infections System (GEIS). Laboratory analyses to identify disease causing agents are conducted at GEIS-supported laboratories, including the Naval Health Research Center (NHRC) in San Diego, California.

On 20 March 2009, the NHRC reported a significant number of adenovirus type 14 (Ad14) isolates from trainees at the Coast Guard training center. This was the first detection of the virus at this installation.<sup>1</sup> The USCG partnered with the Armed Forces Health Surveillance Center (AFHSC) to conduct an epidemiologic and environmental investigation. Because analyses are ongoing, a final, detailed report of the investigation is not yet available.

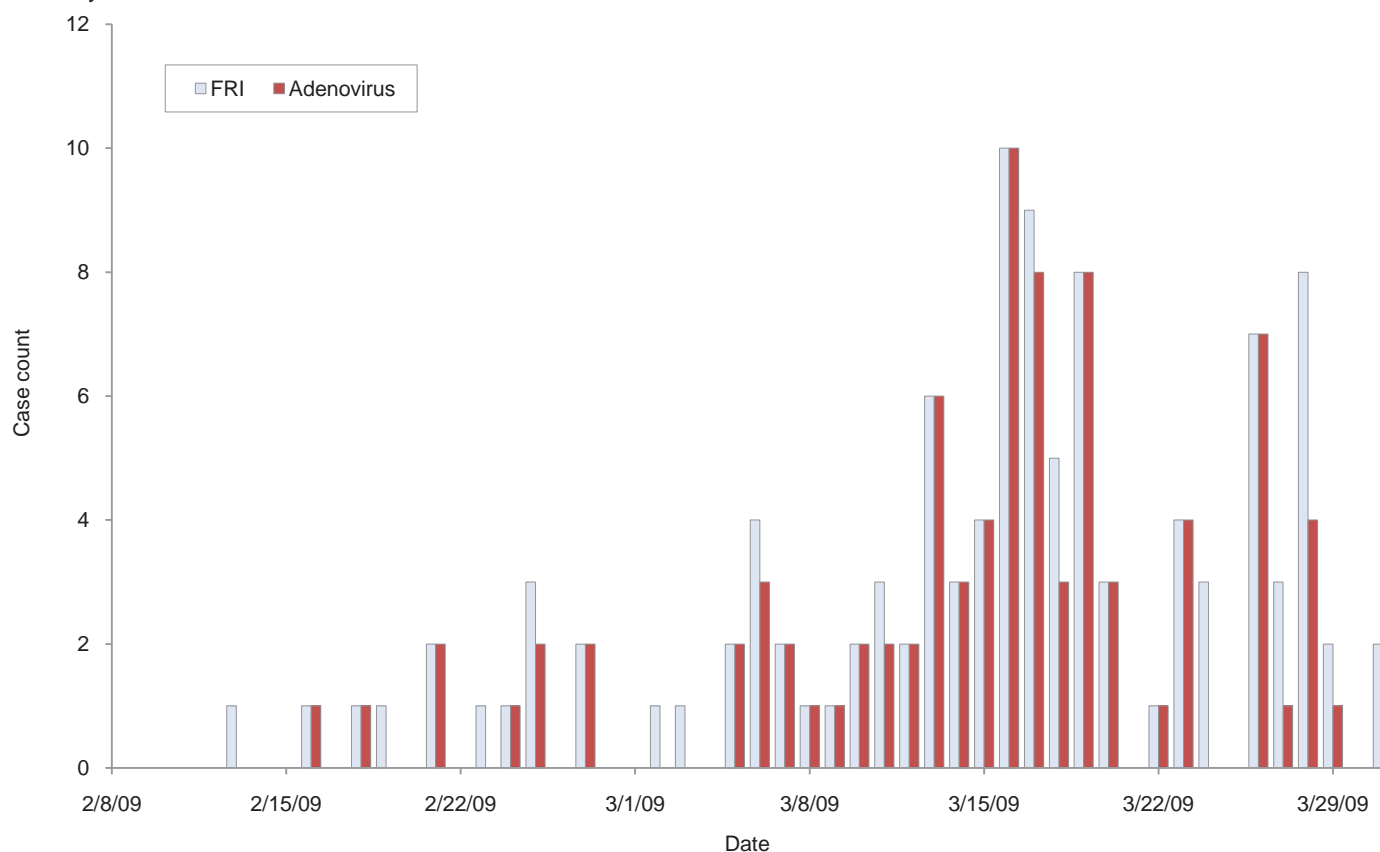
An epidemiological look-back suggested that the likely index case emerged in February 2009. An epidemic curve of

the subsequent period documents the number of FRI cases each day (and the number positive for adenovirus) (Figure 1). From mid-February through the end of March, adenovirus was isolated in 81 (78.6%) of 103 FRI cases; nearly all of the adenoviruses that have been evaluated in detail have been adenovirus type 14 (Ad14).

High rates of febrile respiratory illness have continued among trainees at Cape May; weekly rates have exceeded 1.5% of the trainee population through the third week of May 2009.

In addition to clinical and laboratory data collection, the recruit barracks, dining facility, gymnasium, clinic, and other facilities were examined both with and without recruits present. Recommendations made to the TRACEN Cape May Commanding Officer and Chief of Health Services included increasing the spacing between bunks; establishing a fever isolation ward; identifying temporary housing, such as Temper tents for contingency planning; increasing spacing between recruits in formations, especially those occurring indoors; and instituting active FRI surveillance among recruits and those in close contact during outbreaks. Air handling systems were adjusted to allow optimum air exchange and humidity.

**Figure 1.** Number of febrile respiratory infection (FRI) cases and laboratory-confirmed adenovirus cases at TRACEN, Cape May, NJ, February- March 2009



Reported by Matthew C. Johns LTJG, USPHS, Sharon L. Ludwig CAPT, USCG/USPHS, Anthony Hawksworth, NHRC, Richard Caldwell, CAPT, USCG/USPHS, Justin Gerding, LT, USCG/USPHS, Ms. Carol Renninger, TRACEN Clinic, and Philip Hershberg, HSI, UCSG.

#### Editorial Comment:

In humans, pathogenic adenovirus strains can cause a variety of clinical manifestations including pneumonia, bronchitis, pharyngitis, kerato-conjunctivitis and gastroenteritis. In otherwise healthy young adults, the clinical courses of adenovirus-associated illnesses are generally self-limited and without long-term sequelae. However, in recruit populations, adenoviruses (particularly, types 4 and 7) can cause massive outbreaks of febrile acute respiratory illnesses — with significant disruptions of recruit training operations (e.g., widespread absences from essential training).<sup>2</sup>

Limiting the spread of adenoviruses during outbreaks is complicated by at least two factors: there is both respiratory and fecal-oral transmission; and the virus can remain viable for weeks on environmental surfaces.

In March and April of 2006, Ad14 simultaneously emerged at five recruit training centers, including San Diego, CA; Lackland AFB, TX; Fort Leonard Wood, MO; Great Lakes, IL; and Fort Benning, GA. Recruits of all the services except the Coast Guard were affected.<sup>1</sup>

Then, in May 2006, Ad14 caused the death of a 12-day-old neonate in New York. Between March and June 2007, 34 cases of Ad14-associated disease were reported from civilians in Oregon and Washington. Of 30 individuals affected in Oregon, 22 were hospitalized, 16 required medical intensive care, and 7 died; the ages of the cases ranged from 2 weeks to 82 years (median: 53 years).

Also in spring 2007, there were increased rates of Ad14-associated febrile respiratory illnesses and a cluster of severe pneumonias among recruits at Lackland AFB, TX.<sup>3,4,5</sup> No epidemiological links were identified between the Lackland and northeastern U.S. Ad-14 clusters.<sup>3</sup>

During 2007 in general, it was estimated that nearly one-half of all Air Force recruits with febrile respiratory illnesses were infected with Ad14; and of Air Force recruits

with febrile respiratory illnesses, 23 were hospitalized with pneumonia, 4 required admission to an intensive care unit, and 1 died.<sup>4,5</sup>

In the U.S. military, routine surveillance of febrile acute respiratory illnesses among recruit trainees is supported by virological analyses. Such laboratory-based surveillance enables etiologic diagnoses (which rarely accompany medical evaluations of acute respiratory illnesses in non-military settings). Surveillance of the etiologies of acute respiratory illnesses in recruit populations enabled the detection of Ad14, an emerging strain of adenovirus of military importance, in military recruit populations in 2006 — and eventually among Coast Guard recruits at Cape May in 2009.

New adenovirus vaccines have been developed against types 4 and 7; they may provide some cross-protection against Ad14 (although this has not been demonstrated). Available antiviral agents are not proven effective as treatments. In the absence of a vaccine or chemoprophylactic drugs for prevention, countermeasures in response to outbreaks focus on disrupting chains of transmission in affected populations (e.g., timely detection and removal of cases from other recruits; increased space between bunks and in military formations).<sup>6</sup>

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## Update: Pneumonia-Influenza and Severe Acute Respiratory Illnesses, Active Components, U.S. Armed Forces, January 1997-March 2009

Historically, military populations have been at high risk of acute respiratory illnesses.<sup>1-4</sup> In the U.S. military, acute respiratory illnesses are leading causes of hospitalizations and ambulatory visits of service members.<sup>5-7</sup>

Upper respiratory infectious illnesses are extremely common among U.S. service members, particularly among recruits and during fall-winter “cold and influenza” seasons. Upper respiratory illnesses are among the leading causes of medical encounters and limited duty dispositions of service members.<sup>6,7</sup> Acute infections of the lower respiratory tract (e.g., pneumonias) are less frequent but more debilitating than upper respiratory illnesses. Consistently, pneumonias and influenza are among the leading causes of hospitalizations of service members.<sup>5,7</sup> Finally, there are sporadic cases and rare outbreaks of severe, life threatening acute respiratory illnesses, usually in recruit camps and during training and operational deployments.<sup>8-10</sup> In 2003, there were 19 cases of severe acute respiratory illnesses among U.S. service members deployed in the Middle East and south-central Asia. Two of the cases were fatal – despite extensive investigation, the etiologies of the cases were not identified.<sup>10</sup>

This report summarizes frequencies, seasonal variability, and general trends of hospitalizations of active component

U.S. service members for “pneumonia and influenza” and severe acute respiratory illnesses (e.g., acute respiratory failure, acute respiratory distress) from January 1997 to March 2009.

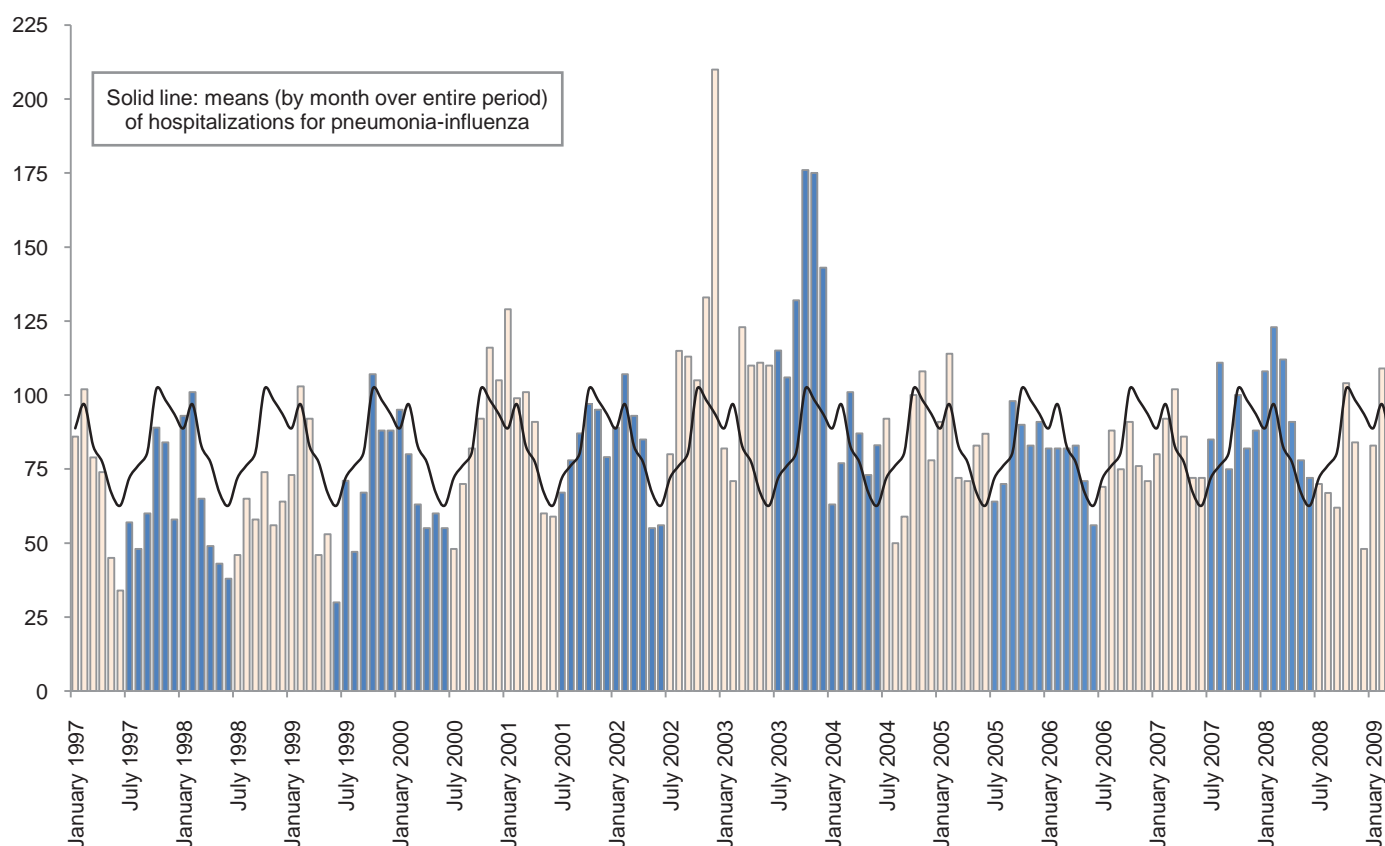
### Methods:

The surveillance period was 1 January 1997 to 31 March 2009. The surveillance population included individuals who served in an active component of the U.S. Armed Forces any time during the surveillance period.

For surveillance purposes, a case of “pneumonia-influenza (P&I)” was defined as a hospitalization with a primary (first-listed) diagnosis of “pneumonia and influenza” (ICD-9: 480-487); or a primary diagnosis of “acute respiratory infection” (ICD-9 460-466) *plus* a secondary diagnosis (in diagnostic position 2 through 8) of “pneumonia and influenza” (ICD-9: 480-487).

A case of “severe acute respiratory illness (SARI)” was defined as a hospitalization with a primary diagnosis of “acute respiratory failure” (ICD-9-CM: 518.81) or “other pulmonary insufficiency” (which includes “acute respiratory distress, acute respiratory insufficiency, adult respiratory distress syndrome [ARDS]”) (ICD-9-CM: 518.82); or

**Figure 1.** Hospitalizations for pneumonia-influenza, by month, active component, U.S. Armed Forces, January 1997-March 2009





a secondary diagnosis (in diagnostic position 2 through 8) of “acute respiratory failure” (ICD-9-CM: 518.81) or “other pulmonary insufficiency” (ICD-9-CM: 518.82) *plus* a primary diagnosis of one of the following: “respiratory distress/insufficiency” (ICD-9-CM: 786.09), “acute respiratory infection” (ICD-9 460-466) or “pneumonia and influenza” (ICD-9: 480-487).

For surveillance purposes, a “respiratory illness year” was considered 1 July through 30 June of the following year. For each service member during each respiratory illness year, only one incident episode each of pneumonia-influenza and severe acute respiratory illness was included in analyses.

### Results:

#### Pneumonia-influenza:

During the period, there were 12,295 incident hospitalizations for pneumonia and influenza (Table 1). The most and fewest cases per respiratory illness year were in 2002-3 (n=1,363) and 1998-9 (n=760), respectively.

Over the entire period, the fewest cases were in the “spring” and “summer” (mean cases per month, April-June: 69.0; July-September: 76.3) and the most in the “fall” and “winter” (mean cases per month, October-December: 98.0; January-March: 90.7) (Table 1). In most years, the distinct seasonality in P&I case occurrence was apparent: in general, P&I-related hospitalizations sharply increased from late summer through early fall, were relatively high from late fall through winter, and sharply decreased through spring (Figure 1). On average, the most cases per month each year were in October (mean: 102.1) and November (mean: 98.3) and the

fewest in June (mean: 62.7). During the period, the most cases in any month were in December 2002 (n=210) and the fewest were in June 1999 (n=30) (Figure 1).

In general, there were relatively fewer P&I-related hospitalizations during the beginning and end of the overall surveillance period relative to the middle. For example, during 37 (84%) of the 44 months from January 1997 through August 2000 and during 25 (60%) of the 42 months from October 2005 through March 2009, there were “deficits” of P&I-related hospitalizations (relative to the means for the respective months overall) (Figure 2). In contrast, during 39 (64%) of the 61 months from September 2000 to September 2005, there were “excess” P&I-related hospitalizations (relative to the means for the respective months overall). During the 10-month period from March-December 2003, there were more than 30 “excess” P&I-related hospitalizations each month and 488 excess hospitalizations overall (Figure 2).

Of note, in seven of the nine months from July 2008 through March 2009, there were fewer P&I-related hospitalizations than “expected” (relative to the means for the respective months overall) (Figure 2).

#### Severe acute respiratory illness:

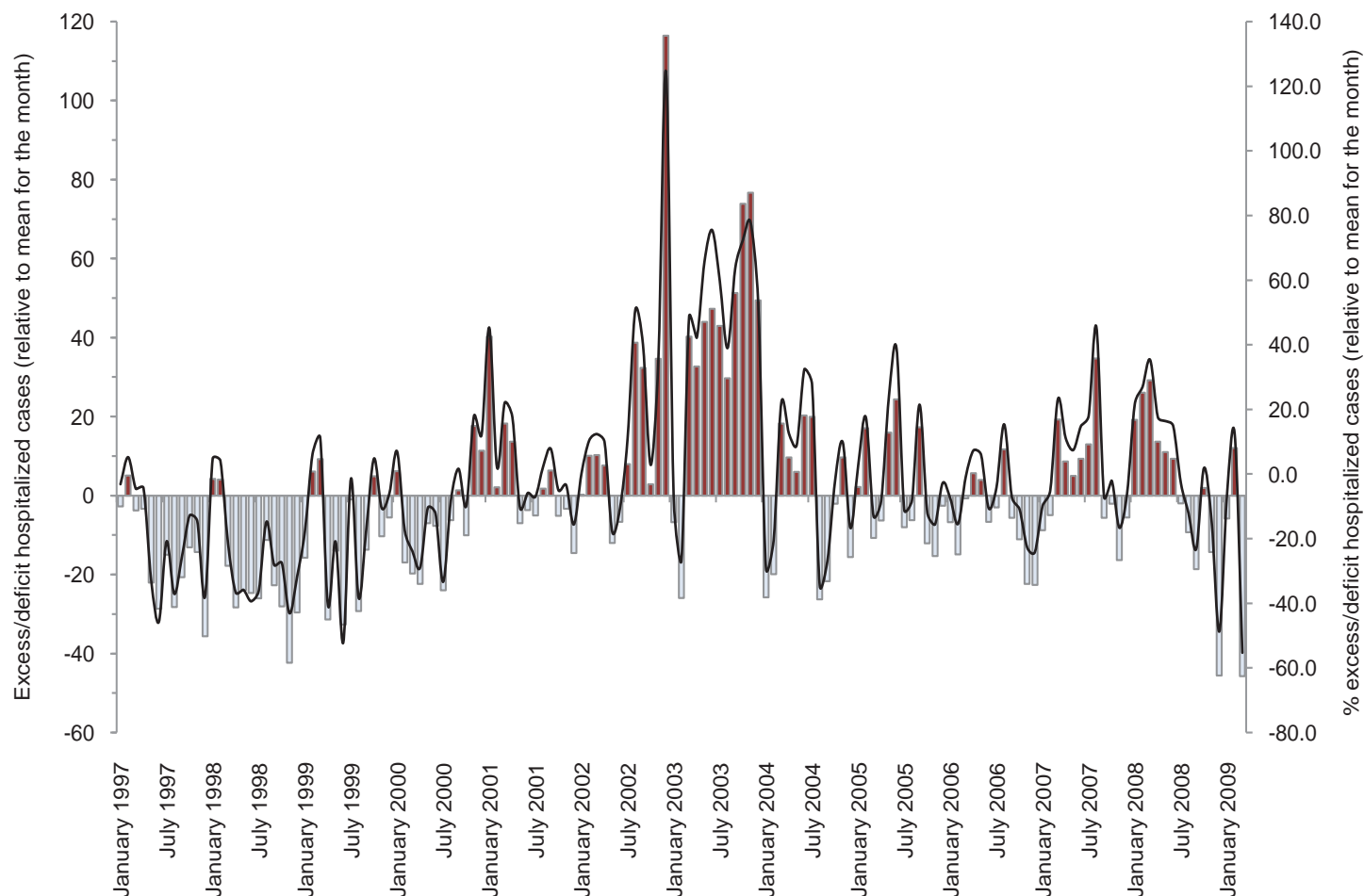
During the period, there were 702 incident hospitalizations for severe acute respiratory illnesses (SARI). The most and fewest cases per year were in 2006-7 (n=94) and 1998-9 (n=18), respectively (Table 1).

Numbers of SARI-related hospitalizations generally increased during the period (Table 1, Figure 3). For example, during 30 (83%) of the 36 months from January 1997 through December 1999, there were “deficits” of SARI-related

**Table 1.** Incident hospitalized cases of pneumonia-influenza and severe acute respiratory illness, by calendar quarter, active component, U.S. Armed Forces, January 1997-March 2009

Pneumonia-influenza															Mean cases per month	
	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Total	No.	Relative no.
Jan-Mar	267	259	268	238	329	289	276	241	277	246	274	343	229	3,536	90.7	1.31
Apr-Jun	153	130	129	170	210	196	331	243	241	210	230	241		2,484	69.0	ref
Jul-Sep	165	169	185	200	232	308	353	201	232	232	271	199		2,747	76.3	1.11
Oct-Dec	231	194	283	313	271	448	494	286	264	238	270	236		3,528	98.0	1.42
<b>Total</b>	<b>816</b>	<b>752</b>	<b>865</b>	<b>921</b>	<b>1,042</b>	<b>1,241</b>	<b>1,454</b>	<b>971</b>	<b>1,014</b>	<b>926</b>	<b>1,045</b>	<b>1,019</b>	<b>229</b>	<b>12,295</b>	<b>83.6</b>	
Severe acute respiratory illness															Mean cases per month	
	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Total	No.	Relative no.
Jan-Mar	13	14	5	10	16	16	16	12	25	13	22	18	11	191	4.9	1.09
Apr-Jun	12	8	7	7	11	10	17	13	22	16	21	18		162	4.5	ref
Jul-Sep	5	3	10	5	9	13	17	14	14	29	14	22		155	4.3	0.96
Oct-Dec	7	3	13	18	10	17	19	13	26	22	21	25		194	5.4	1.20
<b>Total</b>	<b>37</b>	<b>28</b>	<b>35</b>	<b>40</b>	<b>46</b>	<b>56</b>	<b>69</b>	<b>52</b>	<b>87</b>	<b>80</b>	<b>78</b>	<b>83</b>	<b>11</b>	<b>702</b>	<b>5.0</b>	

**Figure 2.** Number (bars) and percent (line) of excess/deficit of hospitalizations for pneumonia-influenza, relative to the mean number for the respective month for the entire period, U.S. Armed Forces, January 1997- March 2009



hospitalizations (relative to the means for the respective months overall) (**Figure 4**). In contrast, during 38 (79%) of the 48 months from January 2005 to December 2008, there were “excess” SARI-related hospitalizations (relative to the means for the respective months overall). Of note, during the five months from July through November 2008, there were 19 “excess” SARI-related hospitalizations of U.S. service members (**Figure 4**).

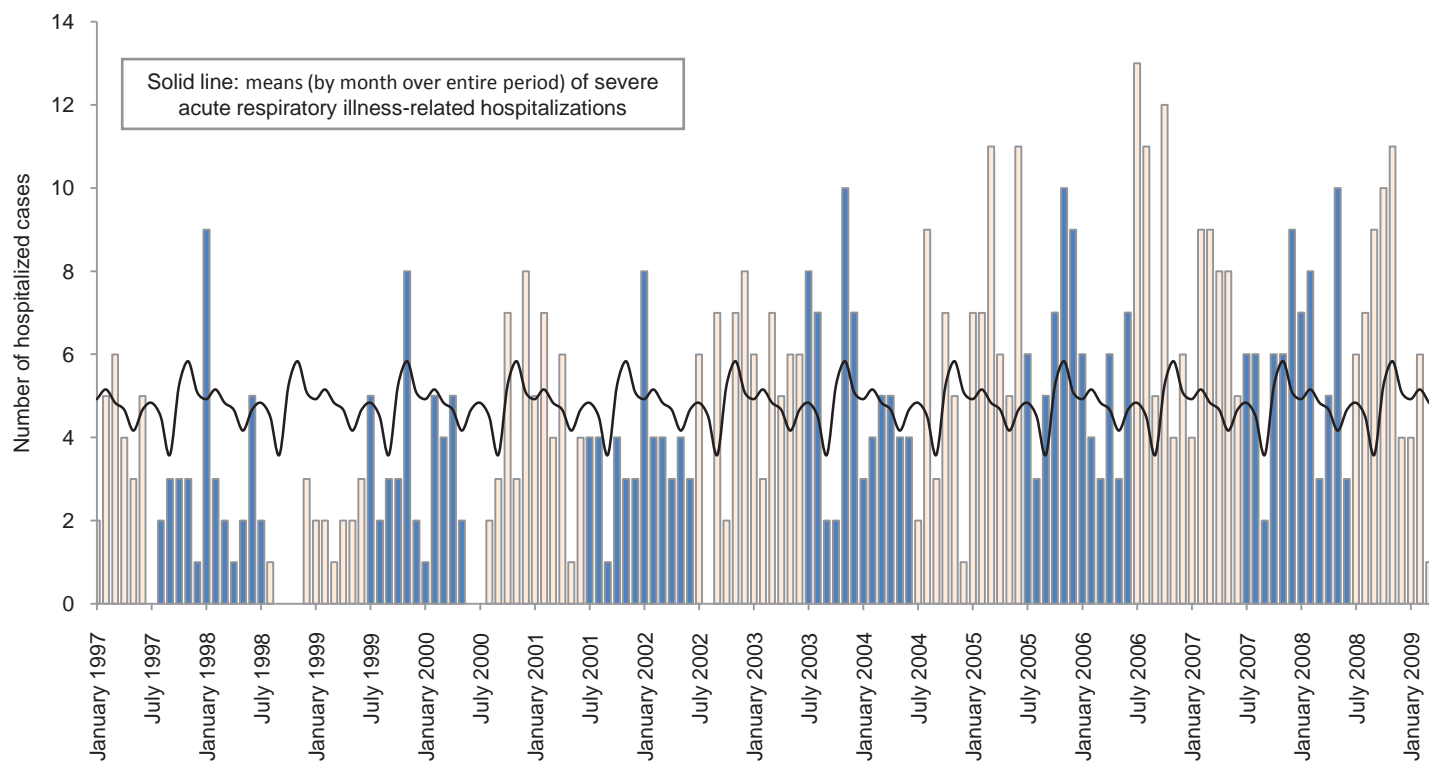
As with pneumonia and influenza, the fewest SARI-related cases were in the “spring” and “summer” (mean cases per month, April-June: 4.5; July-September: 4.3) and the most in the “fall” and “winter” (mean cases per month, October-December: 5.4; January-March: 4.9) (**Table 1**). In contrast to the distinct seasonality of pneumonia-influenza incidence, there was no consistent month-to-month or seasonal variability in SARI-related hospitalizations (**Table 1**, **Figure 3**). For the entire period, the most cases in any month were in July 2006 ( $n=13$ ), and October 2006 ( $n=12$ ); in seven months overall – including six (14%) of 43 months from January 1997 to July 2000, there were no SARI-related hospitalizations (**Figure 3**).

#### Editorial Comment:

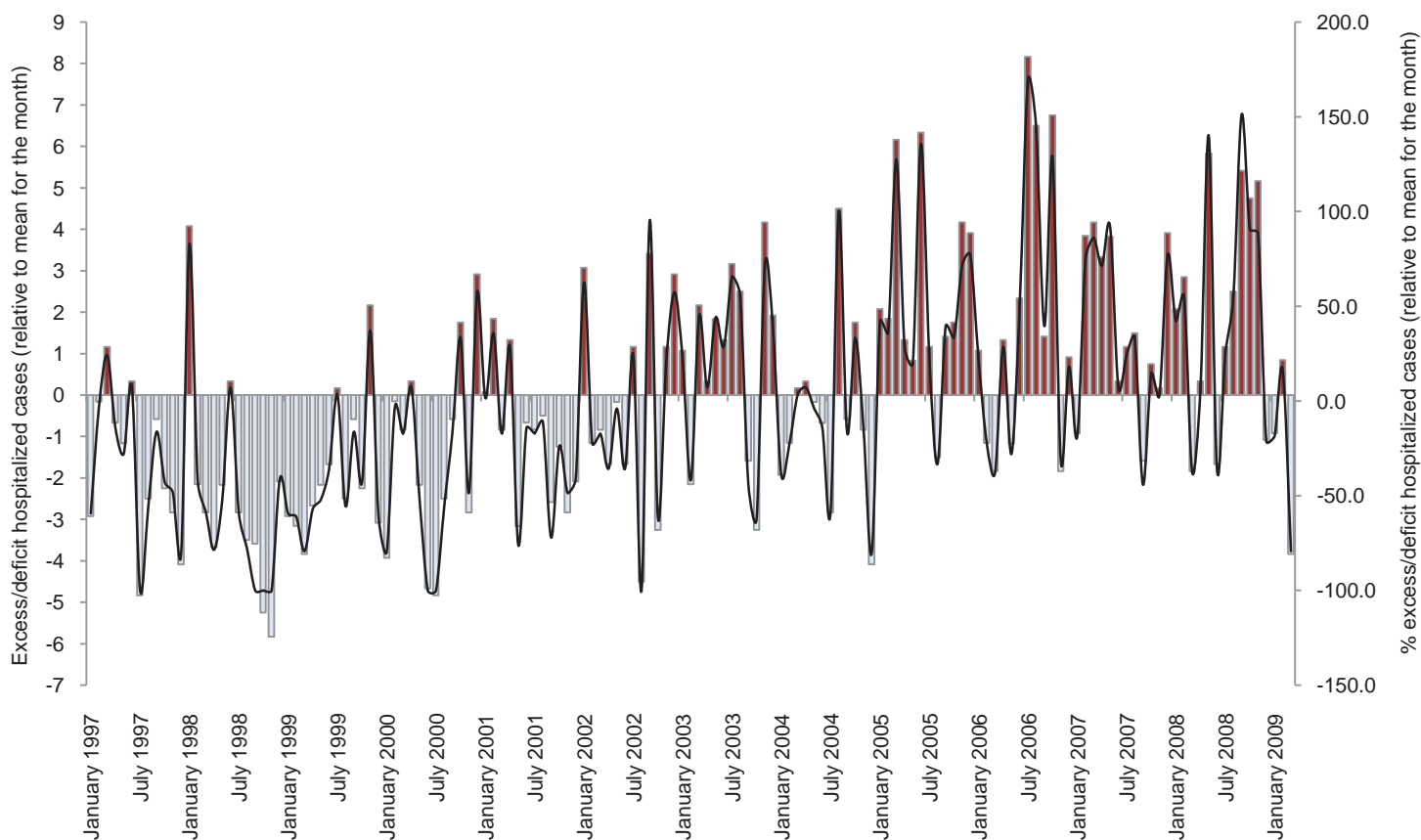
Compared to the general experience since 1997, in the past few years – particularly since the fall of 2005, there have been relatively few hospitalizations for pneumonia-influenza (relative to seasonal norms). During the 2008-9 fall-winter season, there were consistently fewer pneumonia-influenza-related hospitalizations than expected based on recent past experience. U.S. military members receive annual influenza immunizations. The recent experience regarding pneumonia-influenza reflects, at least in part, the effectiveness of influenza vaccines against predominant circulating strains.<sup>11</sup>

Since the fall of 2002 in general – and particularly since January 2005, there have been relatively more hospitalizations for severe acute respiratory illnesses among active military members; the trend continued during the recently passed fall-winter season. Because the case definition used for this analysis required a respiratory illness-specific primary diagnosis (indicative of the primary reason for hospitalization), it is unlikely that the increase reflects complications of combat-related trauma or associated care.

**Figure 3.** Hospitalizations for severe acute respiratory illness, by month, active component, U.S. Armed Forces, January 1997-March 2009



**Figure 4.** Number (bars) and percent (line) of excess/deficit of hospitalizations for severe acute respiratory illness, relative to the mean number for the respective month for the entire period, U.S. Armed Forces, January 1997-March 2009



In response to the cluster of “severe acute pneumonitis” cases among deployed service members in the spring-summer of 2003<sup>9</sup>, the MSMR has tracked incident episodes of “severe acute pneumonia” among service members deployed to or within 30 days of returning from service in Afghanistan or Iraq (using a similar but not identical case definition as for this report) (see page 26). Since 2004, there have been consistently few cases per month of severe acute pneumonia temporally related to deployment (range, cases per month: 0-4; annual mean cases per month: 0.5-1.7) (page 26). Thus, deployment-related cases may explain some but not all of the increase in severe acute respiratory illness cases since 2002. Another contributory cause may be the recent emergence and spread of adenovirus type 14; it has become a significant pathogen – with potential to cause severe disease — among U.S. military trainees.<sup>12-14</sup>

This analysis clearly documents the seasonality of pneumonia-influenza incidence among U.S. service members. From 1997 through 2008, the fewest pneumonia-influenza hospitalizations were in June and the most in October. In most years of the period, there were sharp increases in pneumonia-influenza hospitalizations beginning in the late summer (July-August). The findings suggest that annual activities to counter seasonal pneumonia-influenza risk should be conducted as soon as possible after the current year’s vaccines are available.

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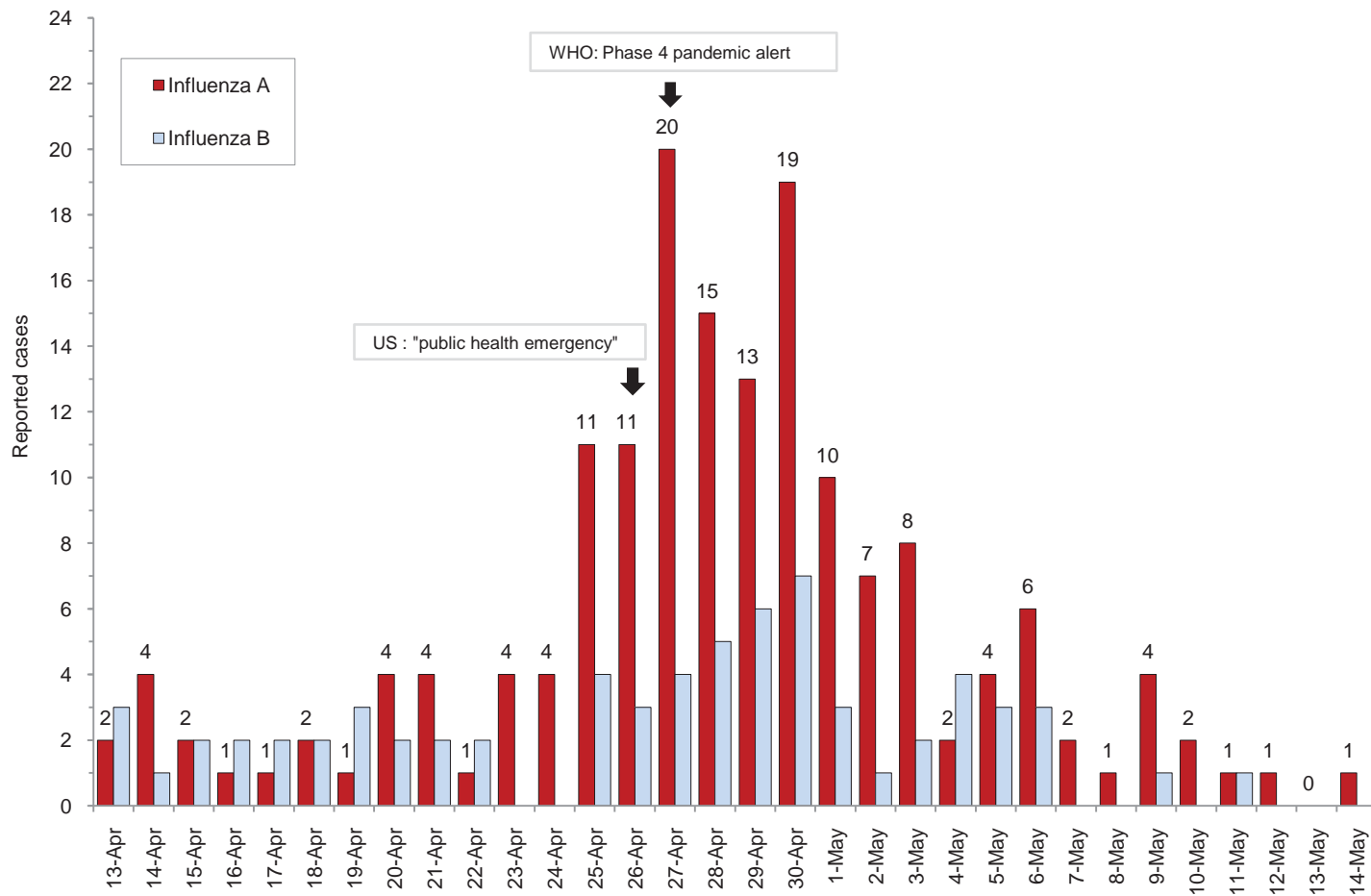
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## SURVEILLANCE SNAPSHOT:

### Influenza A and B, service members and beneficiaries, April-May 2009

Cases of influenza A and B reported as notifiable events, service members and beneficiaries, U.S. Armed Forces, 13 April-14 May 2009





## Update: Deployment Health Assessments, U.S. Armed Forces, May 2009

Since January 2003, peaks and troughs in the numbers of pre- and post-deployment health assessment forms transmitted to the Armed Forces Health Surveillance Center generally corresponded to times of departure and return of large numbers of deployers. Since April 2006, numbers of post-deployment health reassessments (PDHRA) transmitted per month have ranged from 17,000 to 36,000 (**Table 1, Figure 1**).

Proportions of deployers who rated their health as “fair” or “poor” on post-deployment health questionnaires generally increased from 8% in May 2008 to 11% in November 2008 and have since been stable at approximately 9%. On PDHRA questionnaires, the proportions who rated their health as “fair” or “poor” during the past 12 months ranged from 11 to 14 % (**Figure 2**).

In general, on post-deployment assessments and reassessments, deployers in the Army and in reserve components were more likely than their respective counterparts to report health and exposure-related concerns (**Table 2, Figure 2**). Both active and reserve component members were more likely to report exposure concerns three to six months after compared to the time of return from deployment (**Figure 3**).

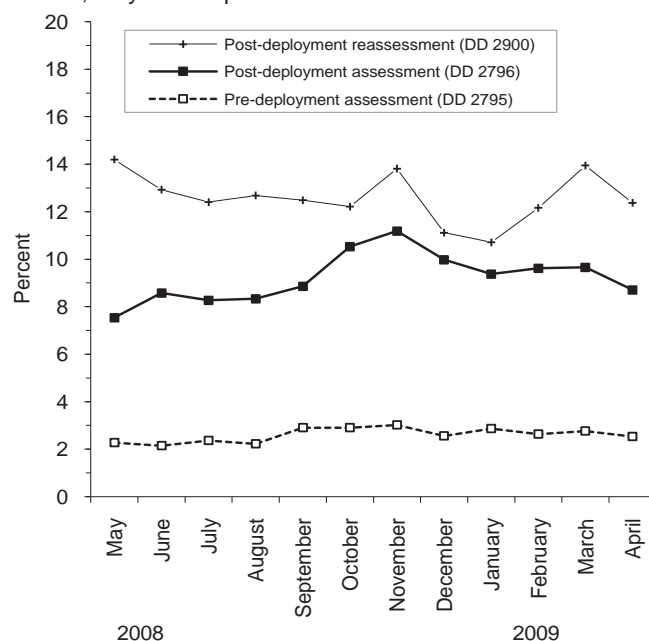
At the time of return from deployment, soldiers serving in the active component were the most likely of all deployers to receive mental health referrals; however, three to six months after returning, active component soldiers were less likely than Army and Marine Corps Reservists to receive mental health referrals (**Table 2**).

Finally, during the past three years, reserve component members have been more likely than active to report “exposure concerns” on post-deployment assessments and reassessments (**Figure 3**).

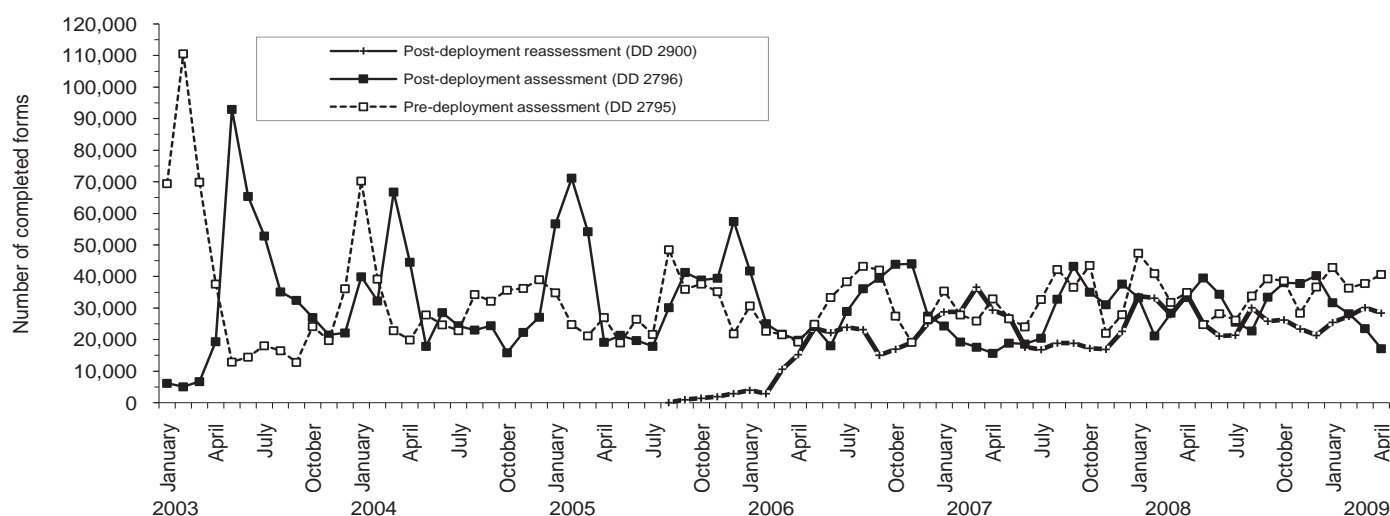
**Table 1.** Deployment-related health assessment forms, by month, U.S. Armed Forces, May 2008-April 2009

	Pre-deployment assessment DD2795		Post-deployment assessment DD2796		Post-deployment reassessment DD2900	
	No.	%	No.	%	No.	%
<b>Total</b>	<b>413,567</b>	<b>100</b>	<b>372,328</b>	<b>100</b>	<b>306,126</b>	<b>100</b>
<b>2008</b>						
May	24,821	6.0	39,570	10.6	25,045	8.2
June	28,175	6.8	34,379	9.2	21,148	6.9
July	26,186	6.3	25,498	6.8	21,432	7.0
August	33,821	8.2	22,787	6.1	30,088	9.8
September	39,268	9.5	33,469	9.0	25,845	8.4
October	38,647	9.3	38,032	10.2	26,271	8.6
November	28,383	6.9	37,785	10.1	23,390	7.6
December	36,711	8.9	40,285	10.8	21,388	7.0
<b>2009</b>						
January	42,834	10.4	31,670	8.5	25,486	8.3
February	36,333	8.8	28,201	7.6	27,415	9.0
March	37,757	9.1	23,469	6.3	30,183	9.9
April	40,631	9.8	17,183	4.6	28,435	9.3

**Figure 2.** Proportion of deployment health assessment forms with self-assessed health status as “fair” or “poor”, U.S. Armed Forces, May 2008-April 2009



**Figure 1.** Total deployment health assessment and reassessment forms, by month, U.S. Armed Forces, January 2003-April 2009

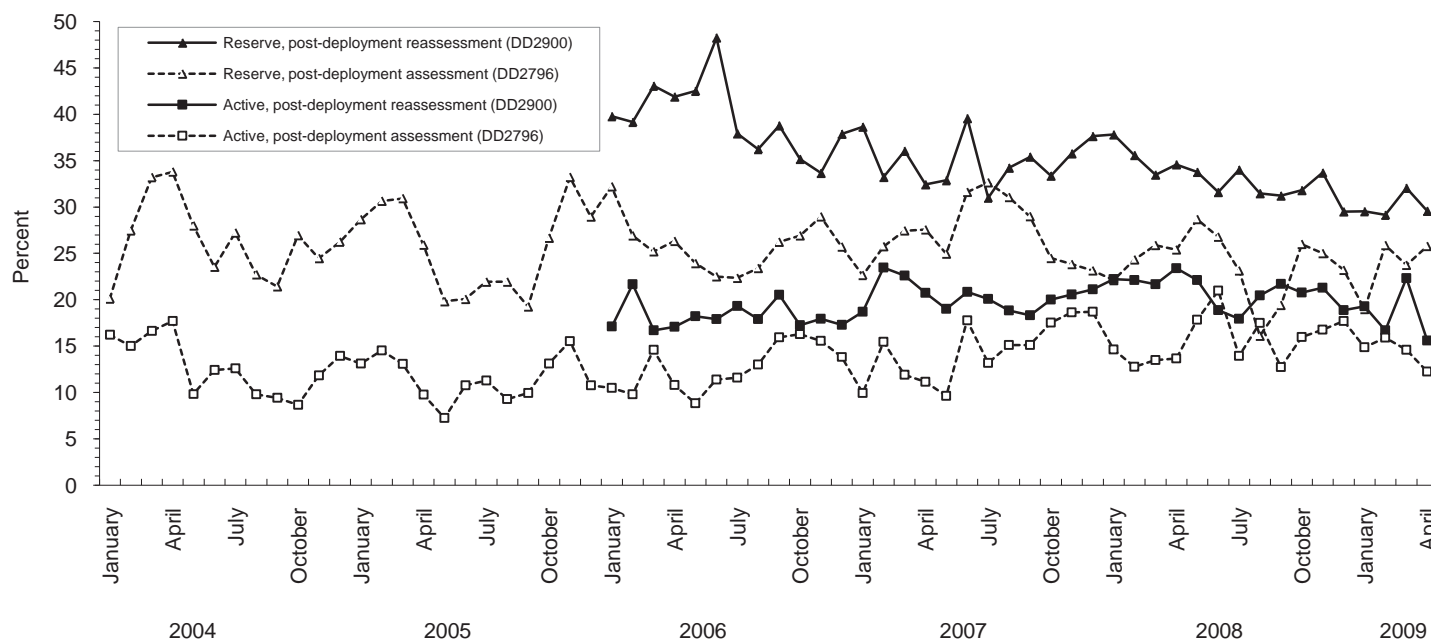


**Table 2.** Percentage of service members who endorsed selected questions/received referrals on health assessment forms, U.S. Armed Forces, May 2008-April 2009

	Army			Navy			Air Force			Marine Corps			All service members		
	Pre-deploy DD2795	Post-deploy DD2796	Reassess DD2900	Pre-deploy DD2795	Post-deploy DD2796	Reassess DD2900	Pre-deploy DD2795	Post-deploy DD2796	Reassess DD2900	Pre-deploy DD2795	Post-deploy DD2796	Reassess DD2900	Pre-deploy DD2795	Post-deploy DD2796	Reassess DD2900
Active component	n=148,941	n=129,209	n=110,509	n=12,541	n=17,196	n=15,003	n=56,665	n=50,262	n=50,896	n=24,315	n=34,799	n=34,669	n=242,462	n=231,466	n=211,077
	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
General health "fair" or "poor"	4.2	10.9	15.4	1.4	4.7	6.1	0.5	3.7	4.3	1.7	6.3	9.1	2.9	8.2	11.0
Health concerns, not wound or injury	14.9	26.1	27.2	4.0	14.0	14.1	1.4	6.1	11.3	3.3	13.3	18.3	10.0	19.0	21.0
Health worse now than before deployed	na	3.3	27.3	na	0.0	13.8	na	0.3	9.1	na	0.0	18.4	na	1.9	20.5
Exposure concerns	na	18.1	22.5	na	16.1	15.7	na	10.7	15.0	na	13.6	18.5	na	15.7	19.6
PTSD symptoms (2 or more)	na	11.3	15.2	na	4.4	7.3	na	2.3	2.8	na	4.3	8.8	na	7.8	10.6
Depression symptoms (any)	na	4.5	36.1	na	0.1	24.9	na	0.3	14.9	na	0.2	31.4	na	2.6	29.4
Referral indicated by provider (any)	5.3	34.8	21.2	5.3	23.1	14.9	1.7	11.1	7.1	3.1	20.9	20.4	4.2	26.7	17.2
Mental health referral indicated*	1.2	8.5	6.4	0.6	4.0	5.6	0.5	1.2	2.1	0.3	2.5	4.5	0.9	5.7	5.0
Medical visit following referral†	94.6	98.1	96.1	91.1	78.5	91.0	76.7	95.8	96.7	63.9	70.5	74.2	90.3	92.5	91.1
Reserve component	n=76,982	n=60,805	n=63,200	n=3,305	n=3,802	n=6,208	n=16,169	n=15,167	n=16,420	n=2,040	n=3,359	n=5,368	n=98,496	n=83,133	n=91,196
	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
General health "fair" or "poor"	2.0	11.4	19.2	0.6	8.7	9.1	0.3	5.0	4.8	1.3	8.8	9.4	1.6	10.0	15.3
Health concerns, not wound or injury	13.5	37.1	48.3	2.8	27.9	29.7	0.6	9.1	13.4	3.4	29.1	33.4	10.8	31.2	39.9
Health worse now than before deployed	na	6.9	36.7	na	0.2	22.7	na	0.3	10.5	na	0.2	25.1	na	5.1	30.4
Exposure concerns	na	25.1	34.8	na	32.1	27.0	na	17.8	20.7	na	21.1	28.0	na	24.0	31.4
PTSD symptoms (2 or more)	na	10.7	24.0	na	5.5	10.3	na	2.0	2.7	na	5.2	12.9	na	8.6	18.6
Depression symptoms (any)	na	7.0	39.5	na	0.2	25.8	na	0.3	14.1	na	0.3	31.8	na	5.2	33.6
Referral indicated by provider (any)	4.2	35.7	35.0	3.8	30.3	18.4	0.7	13.4	5.6	3.9	32.5	30.4	3.6	31.3	28.3
Mental health referral indicated*	0.5	5.0	13.2	0.5	3.3	4.7	0.0	0.6	0.9	0.4	3.2	9.7	0.4	4.0	10.2
Medical visit following referral†	95.2	97.0	29.4	91.3	90.6	43.2	40.0	64.0	36.7	67.5	58.4	20.1	91.6	91.0	29.5

\*Includes behavioral health, combat stress and substance abuse referrals.

†Record of inpatient or outpatient visit within 6 months after referral.

**Figure 3.** Proportion of service members who endorse exposure concerns on post-deployment health assessments, U.S. Armed Forces, January 2004-April 2009

# Sentinel reportable events for service members and beneficiaries at U.S. Army medical facilities, cumulative numbers\* for calendar years through 30 April 2008 and 30 April 2009



Reporting locations	Number of reports all events†		Food-borne								Vaccine preventable					
			Campylo-bacter		Giardia		Salmonella		Shigella		Hepatitis A		Hepatitis B		Varicella	
	2008	2009	2008	2009	2008	2009	2008	2009	2008	2009	2008	2009	2008	2009	2008	2009
<b>NORTH ATLANTIC</b>																
Washington, DC Area	142	168	1	.	2	1	1	.	.	.	.	.	1	1	6	1
Aberdeen, MD	0	10	.	.	.	.	.	.	.	.	.	.	.	.	.	.
FT Belvoir, VA	109	94	1	3	.	.	.	1	.	.	.	.	.	.	.	.
FT Bragg, NC	537	637	.	.	.	.	3	3	.	.	.	.	.	2	.	.
FT Drum, NY	144	14	.	.	.	.	.	.	.	.	.	.	.	.	.	.
FT Eustis, VA	373	77	.	.	.	1	.	.	.	.	.	.	.	.	.	.
FT Knox, KY	332	61	2	.	.	.	.	.	.	.	.	.	.	.	.	.
FT Lee, VA	126	220	.	.	.	.	.	.	.	.	.	.	.	.	1	.
FT Meade, MD	186	35	.	.	.	.	.	.	.	.	.	.	.	.	.	.
West Point, NY	44	58	.	1	.	.	.	.	.	.	.	.	.	.	.	.
<b>GREAT PLAINS</b>																
FT Sam Houston, TX	352	267	.	1	.	2	3	2	1	.	.	.	.	.	.	.
FT Bliss, TX	191	280	.	.	.	.	1	1	.	1	.	.	.	6	.	.
FT Carson, CO	328	349	.	1	.	.	2	.	.	.	.	.	.	.	.	.
FT Hood, TX	776	768	1	3	.	.	5	7	5	2	.	.	.	.	1	.
FT Huachuca, AZ	30	31	.	.	.	.	.	.	.	.	.	.	.	.	.	.
FT Leavenworth, KS	16	19	.	.	.	.	.	.	.	.	.	.	.	.	.	.
FT Leonard Wood, MO	311	203	.	.	2	.	1	.	.	.	.	.	1	.	.	1
FT Polk, LA	53	141	.	.	.	1	.	.	.	.	.	.	.	.	1	.
FT Riley, KS	253	217	.	.	.	.	1	1	.	.	.	.	1	.	.	.
FT Sill, OK	138	107	.	.	.	.	.	.	.	1	.	.	.	.	.	.
<b>SOUTHEAST</b>																
FT Gordon, GA	446	359	.	.	.	.	2	1	3	1	.	.	.	.	1	1
FT Benning, GA	145	57	.	.	.	.	.	.	.	1	.	.	.	.	.	.
FT Campbell, KY	144	48	.	.	.	.	.	1	.	.	.	.	.	.	.	.
FT Jackson, SC	74	0	.	.	.	.	.	.	.	.	.	.	1	.	.	.
FT Rucker, AL	30	25	.	.	.	.	.	.	.	.	.	.	.	.	.	.
FT Stewart, GA	265	390	.	.	1	.	4	3	.	3	.	.	5	.	.	.
<b>WESTERN</b>																
FT Lewis, WA	407	575	1	.	.	.	.	1	.	.	.	.	.	.	.	.
FT Irwin, CA	4	44	.	.	.	.	.	.	.	1	.	.	.	.	.	.
FT Wainwright, AK	170	93	3	.	.	.	.	.	.	.	.	.	.	.	.	.
<b>PACIFIC</b>																
Hawaii	276	266	9	8	1	.	4	4	2	.	.	.	2	.	.	.
Japan	23	3	1	.	.	.	.	.	.	.	.	.	.	.	.	.
Korea	242	323	.	.	.	.	.	.	.	.	.	.	.	.	1	.
<b>OTHER LOCATIONS</b>																
Germany	567	694	4	7	1	.	2	4	.	.	.	.	4	1	.	1
Unknown	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.
<b>Total</b>	<b>7,234</b>	<b>6,633</b>	<b>23</b>	<b>24</b>	<b>7</b>	<b>5</b>	<b>29</b>	<b>29</b>	<b>11</b>	<b>10</b>	<b>0</b>	<b>0</b>	<b>15</b>	<b>10</b>	<b>11</b>	<b>4</b>

\*Events reported by May 7, 2008 and 2009

†Seventy medical events/conditions specified by Tri-Service Reportable Events Guidelines and Case Definitions, May 2004.

Note: Completeness and timeliness of reporting vary by facility.

# Sentinel reportable events for service members and beneficiaries at U.S. Army medical facilities, cumulative numbers\* for calendar years through 30 April 2008 and 30 April 2009



Army

Reporting location	Arthropod-borne				Sexually transmitted								Environmental			
	Lyme disease		Malaria		Chlamydia		Gonorrhea		Syphilis†		Urethritis§		Cold		Heat	
	2008	2009	2008	2009	2008	2009	2008	2009	2008	2009	2008	2009	2008	2009	2008	2009
<b>NORTH ATLANTIC</b>																
Washington, DC Area	1	9	.	.	36	58	15	5	3	7	.	1	.	.	.	.
Aberdeen, MD	.	.	.	.	.	2	.	1	.	.	.	.	.	.	.	.
FT Belvoir, VA	.	.	.	.	54	76	1	9	.	.	.	.	.	.	.	.
FT Bragg, NC	.	.	.	.	353	500	66	85	1	2	24	14	.	1	.	6
FT Drum, NY	3	.	.	.	90	7	10	3	.	.	.	.	.	.	.	.
FT Eustis, VA	.	.	.	.	76	64	11	12	2	.	.	.	.	.	.	.
FT Knox, KY	.	1	.	.	61	48	14	10	.	.	.	.	.	.	.	.
FT Lee, VA	1	1	.	.	79	196	35	21	1	2	.	.	.	.	.	.
FT Meade, MD	1	.	.	.	25	22	1	.	.	.	.	.	.	.	.	.
West Point, NY	5	5	.	.	10	20	.	1	.	.	.	.	.	.	.	.
<b>GREAT PLAINS</b>																
FT Sam Houston, TX	.	.	.	.	96	166	27	25	10	3	.	.	1	.	.	.
FT Bliss, TX	.	.	.	.	118	161	25	25	.	4	.	.	.	.	.	.
FT Carson, CO	.	.	.	.	186	225	18	23	.	.	10	.	.	1	.	.
FT Hood, TX	.	.	.	.	521	472	97	116	.	3	31	69	.	.	.	.
FT Huachuca, AZ	.	.	.	.	26	21	3	.	.	.	.	.	.	.	.	.
FT Leavenworth, KS	.	.	.	.	16	14	.	3	.	1	.	.	.	.	.	1
FT Leonard Wood, MO	.	.	.	.	75	134	8	17	.	.	.	.	3	1	.	.
FT Polk, LA	.	.	.	.	36	129	15	8	.	.	.	.	.	.	.	.
FT Riley, KS	1	.	1	.	122	135	7	20	.	.	.	1	1	1	.	.
FT Sill, OK	.	.	.	.	37	63	8	13	.	.	.	.	.	.	.	.
<b>SOUTHEAST</b>																
FT Gordon, GA	.	.	.	.	180	213	55	38	.	.	.	.	.	.	.	.
FT Benning, GA	.	.	.	3	90	38	27	8	1	.	.	.	.	.	1	.
FT Campbell, KY	.	.	.	.	51	14	2	3	1	.	.	.	.	.	.	.
FT Jackson, SC	.	.	.	.	63	.	10	.	.	.	.	.	.	.	.	.
FT Rucker, AL	1	.	.	.	22	23	7	2	.	.	.	.	.	.	.	.
FT Stewart, GA	.	.	1	.	211	313	33	49	1	4	.	.	.	.	.	1
<b>WESTERN</b>																
FT Lewis, WA	.	.	.	.	302	363	30	37	1	1	8	4	.	.	.	.
FT Irwin, CA	.	.	.	.	4	41	.	1	.	.	.	.	.	.	.	.
FT Wainwright, AK	1	.	.	.	104	69	13	6	.	.	.	.	11	1	.	.
<b>PACIFIC</b>																
Hawaii	.	.	.	.	195	197	26	23	.	.	.	.	.	.	.	.
Japan	.	.	.	.	13	3	2	.	.	.	.	.	.	.	.	.
Korea	.	.	.	.	204	310	24	9	3	2	.	.	.	1	.	.
<b>OTHER LOCATIONS</b>																
Germany	12	14	4	1	313	396	72	44	3	8	.	.	8	1	.	1
Unknown	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
<b>Total</b>	<b>26</b>	<b>30</b>	<b>6</b>	<b>4</b>	<b>3,769</b>	<b>4,493</b>	<b>662</b>	<b>617</b>	<b>27</b>	<b>37</b>	<b>73</b>	<b>89</b>	<b>24</b>	<b>7</b>	<b>1</b>	<b>9</b>

†Primary and secondary.

§Urethritis, non-gonococcal (NGU).

# Sentinel reportable events for service members and beneficiaries at U.S. Air Force medical facilities, cumulative numbers\* for calendar years through 30 April 2008 and 30 April 2009



Air Force

Reporting locations	Number of reports all events†		Food-borne								Vaccine preventable					
			Campylo-bacter		Giardia		Salmonella		Shigella		Hepatitis A		Hepatitis B		Varicella	
	2008	2009	2008	2009	2008	2009	2008	2009	2008	2009	2008	2009	2008	2009	2008	2009
Air Combat Cmd	919	550	2	.	3	3	1	3	3	1	.	.	18	.	4	1
Air Education & Training Cmd	350	614	.	1	2	1	1	7	.	1	.	.	2	2	2	3
Air Force Dist. of Washington	107	77	.	.	.	.	1	1	.	.	.	.	1	1	.	.
Air Force Materiel Cmd	314	172	1	.	1	1	2	1	2	.	.	.	.	.	.	.
Air Force Special Ops Cmd	83	65	.	1	.	.	.	.	.	.	.	.	2	.	.	.
Air Force Space Cmd	186	118	.	1	.	.	2	2	.	.	.	.	1	.	1	1
Air Mobility Cmd	449	293	1	2	2	1	.	3	.	1	.	.	1	1	4	2
Pacific Air Forces	346	298	4	.	3	1	1	.	.	.	.	.	5	3	2	1
U.S. Air Forces in Europe	222	225	1	2	.	.	.	.	.	.	.	.	1	2	1	3
U.S. Air Force Academy	11	23	.	.	.	2	.	1	.	.	.	.	.	.	.	.
Other	213	58	1	1	1	1	2	1	.	.	.	.	.	.	.	1
<b>Total</b>	<b>3,200</b>	<b>2,493</b>	<b>10</b>	<b>8</b>	<b>12</b>	<b>10</b>	<b>10</b>	<b>19</b>	<b>5</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>31</b>	<b>9</b>	<b>14</b>	<b>12</b>

\*Events reported by May 7, 2009

†Seventy medical events/conditions specified by Tri-Service Reportable Events Guidelines and Case Definitions, May 2004.

Note: Completeness and timeliness of reporting vary by facility

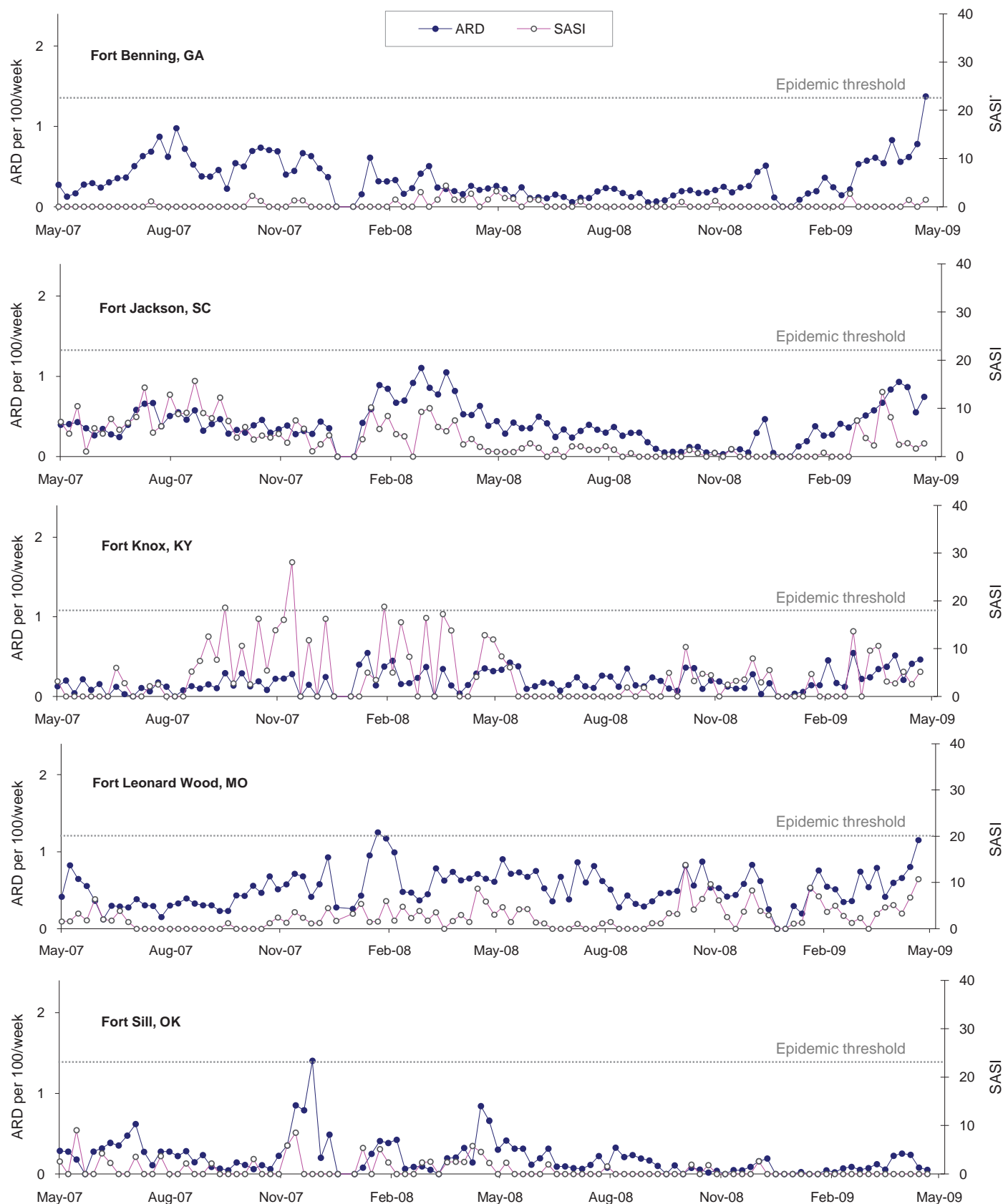
Reporting location	Arthropod-borne				Sexually transmitted								Environmental			
	Lyme disease		Malaria		Chlamydia		Gonorrhea		Syphilis‡		Urethritis§		Cold		Heat	
	2008	2009	2008	2009	2008	2009	2008	2009	2008	2009	2008	2009	2008	2009	2008	2009
Air Combat Cmd	3	2	.	.	470	363	51	28	1	.	1	.	3	4	.	.
Air Education & Training Cmd	2	.	.	.	174	347	11	31	.	2	.	.	.	.	.	.
Air Force Dist. of Washington	1	2	.	.	60	52	7	3	1	.	.	.	.	.	.	.
Air Force Materiel Cmd	2	.	1	.	163	117	13	12	2	1	.	.	.	1	.	.
Air Force Special Ops Cmd	.	1	.	.	68	53	6	1	.	1	.	.	.	1	.	.
Air Force Space Cmd	1	.	.	.	107	93	5	3	.	.	.	.	.	.	.	.
Air Mobility Cmd	1	5	.	.	258	172	25	20	.	1	.	.	2	9	2	.
Pacific Air Forces	.	.	.	.	270	116	12	15	1	1	.	.	.	9	.	.
U.S. Air Forces in Europe	.	.	1	1	174	154	12	11	.	1	.	.	.	2	.	.
U.S. Air Force Academy	1	.	.	.	10	15	.	.	.	.	.	.	.	.	.	.
Other	1	.	.	1	170	13	7	4	1	.	.	.	.	.	.	3
<b>Total</b>	<b>12</b>	<b>10</b>	<b>2</b>	<b>2</b>	<b>1,924</b>	<b>1,495</b>	<b>149</b>	<b>128</b>	<b>6</b>	<b>7</b>	<b>1</b>	<b>0</b>	<b>5</b>	<b>26</b>	<b>2</b>	<b>3</b>

‡Primary and secondary.

§Urethritis, non-gonococcal (NGU).



# Acute respiratory disease (ARD) and streptococcal pharyngitis rates (SASI\*), basic combat training centers, U.S. Army, by week, May 2007-May 2009



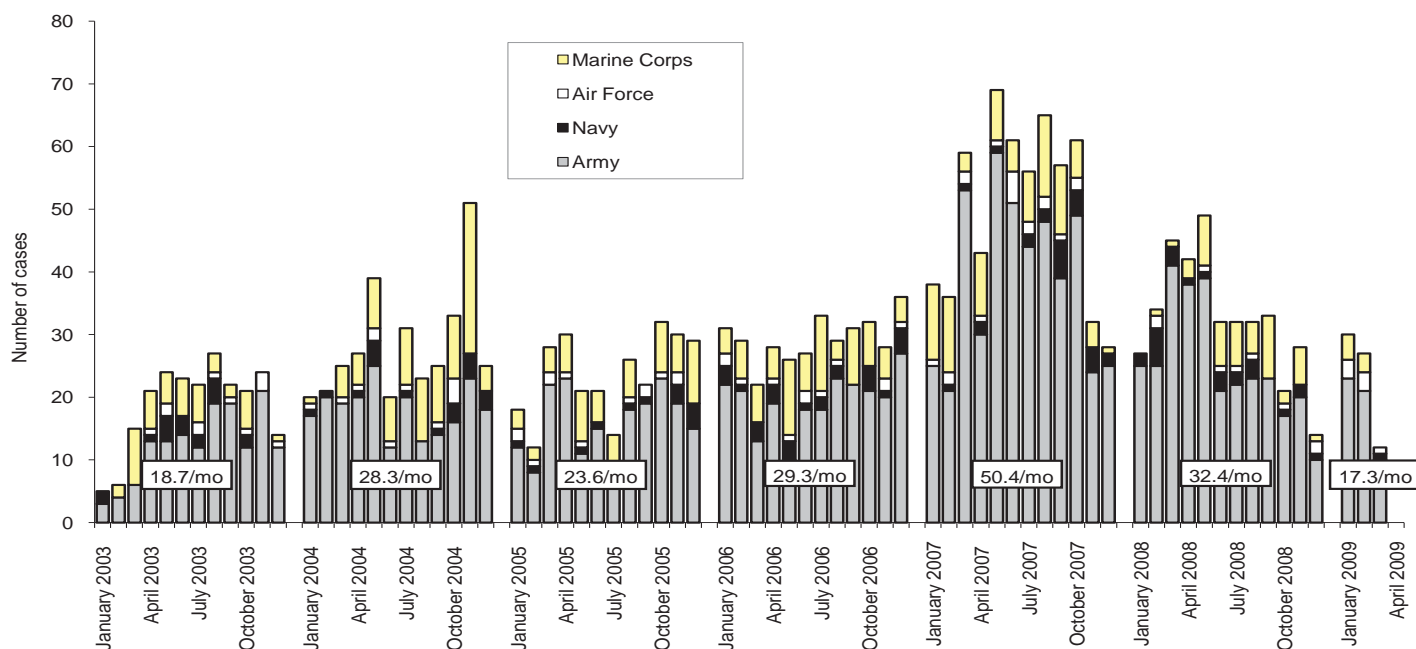
\* Streptococcal-ARD surveillance index (SASI) = ARD rate x % positive culture for group A streptococcus

ARD rate = cases per 100 trainees per week

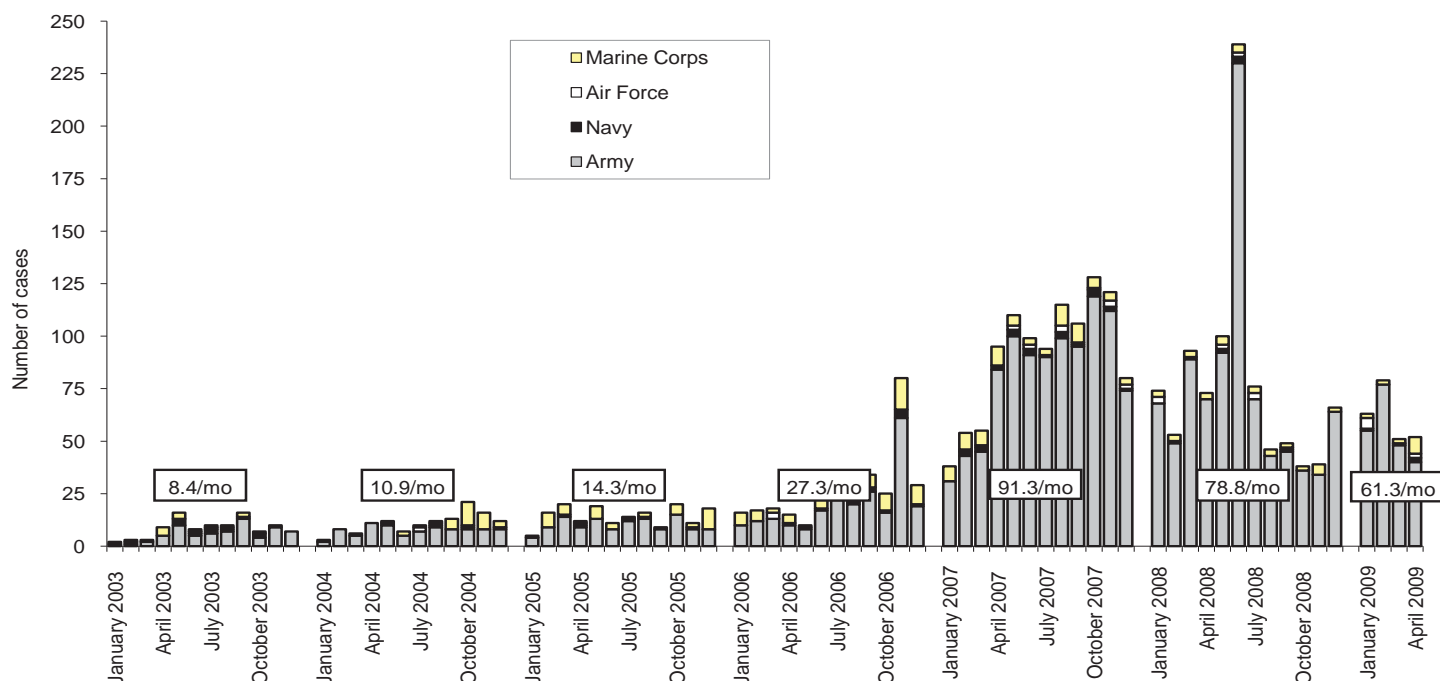
ARD rate  $\geq 1.5$  or SASI  $\geq 25.0$  for 2 consecutive weeks are surveillance indicators of epidemics

## Deployment-related conditions of special surveillance interest, U.S. Armed Forces, by month and service, January 2003 - April 2009 (data as of 27 May 2009)

Traumatic brain injury, hospitalizations (ICD-9: 310.2, 800-801, 803-804, 850-854, 950.1-950.3, 959.01, V15.5\_1-9, V15.5\_A-F)\*



Traumatic brain injury, multiple ambulatory visits (without hospitalization), (ICD-9: 310.2, 800-801, 803-804, 850-854, 950.1-950.3, 959.01, V15.5\_1-9, V15.5\_A-F)†



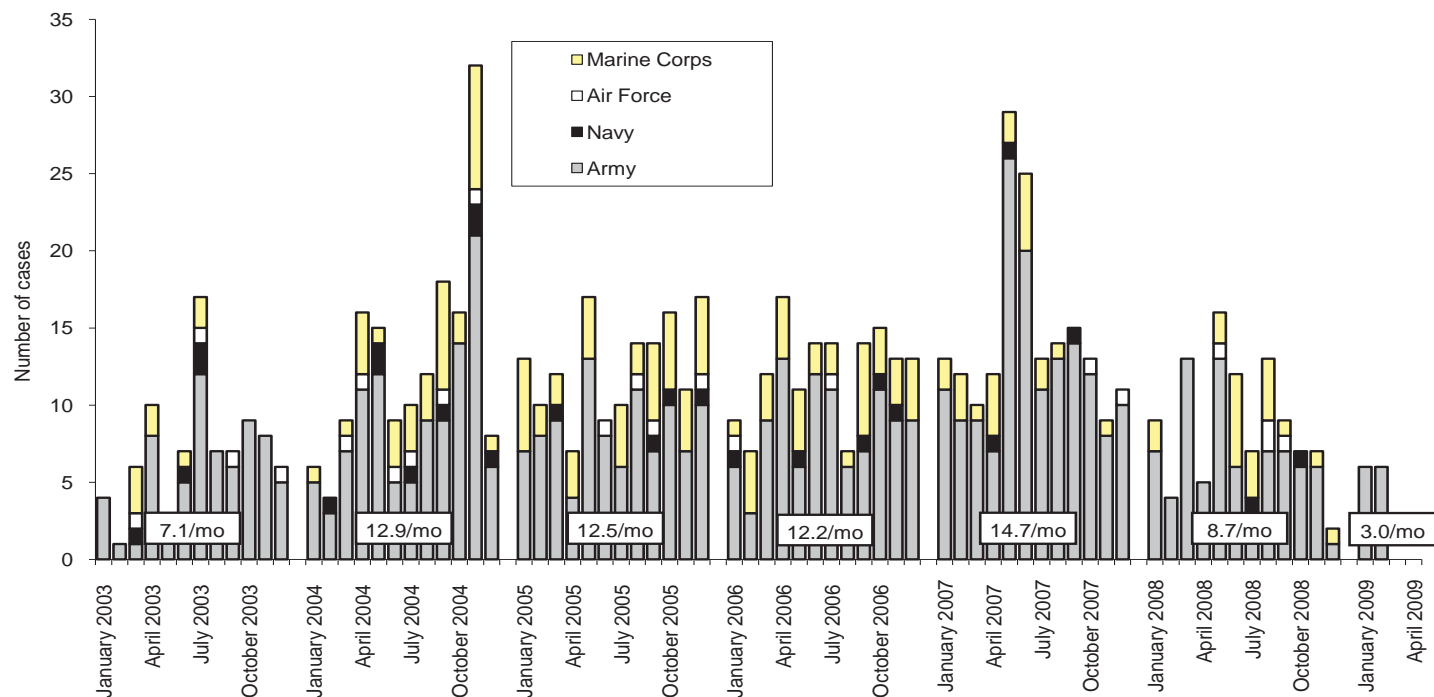
Reference: Armed Forces Health Surveillance Center. Frequencies, rates and trends of use of diagnostic codes indicative of traumatic brain injury (TBI), July 1999-June 2008. *MSMR*. Dec 2008; 15(10):2-9.

\*Indicator diagnosis (one per individual) during a hospitalization while deployed to/within 30 days of returning from OEF/OIF.

†Two or more ambulatory visits at least 7 days apart (one case per individual) while deployed to/within 30 days of returning from OEF/OIF.

## Deployment-related conditions of special surveillance interest, U.S. Armed Forces, by month and service, January 2003 - April 2009 (data as of 27 May 2009)

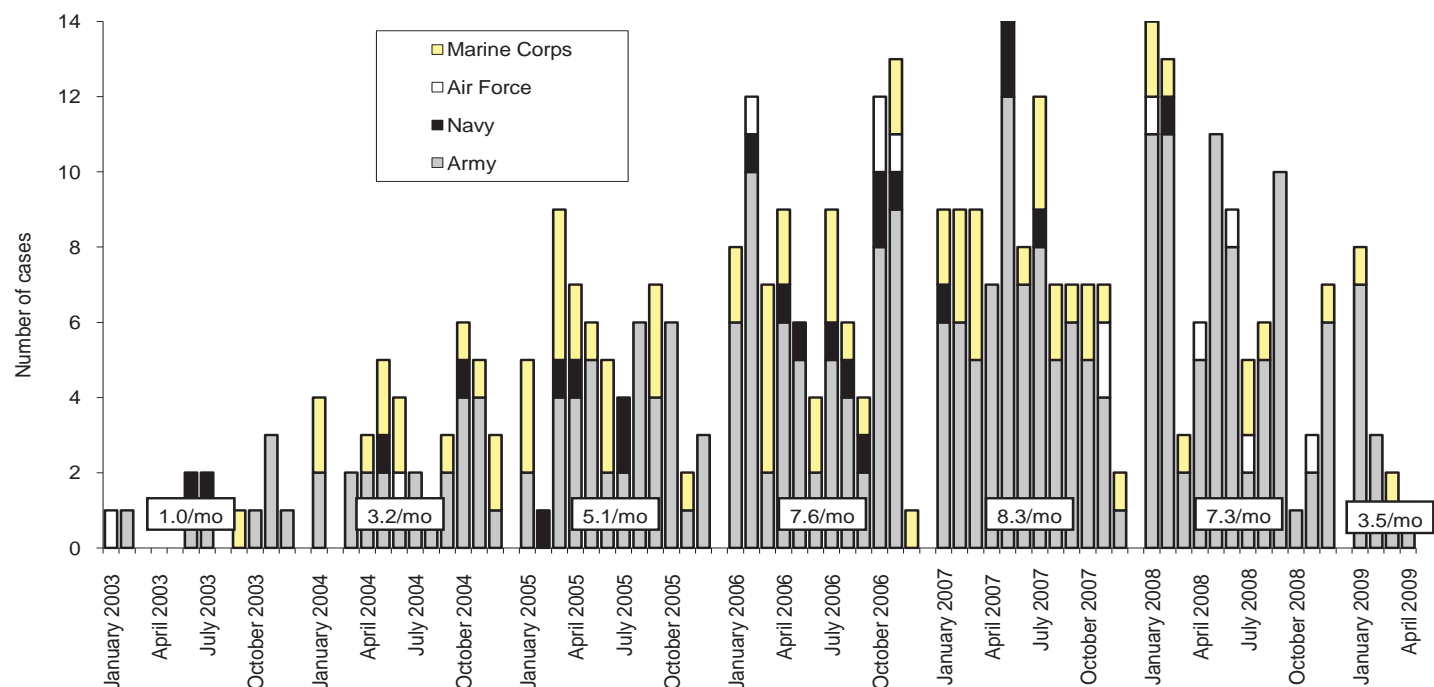
Amputations (ICD-9: 887, 896, 897, V49.6 except V49.61-V49.62, V49.7 except V49.71-V49.72, PR 84.0-PR 84.1, except PR 84.01-PR 84.02 and PR 84.11)\*



Reference: Army Medical Surveillance Activity. Deployment-related condition of special surveillance interest: amputations. Amputations of lower and upper extremities, U.S. Armed Forces, 1990-2004. *MSMR*. Jan 2005;11(1):2-6.

\*Indicator diagnosis (one per individual) during a hospitalization while deployed to/within 365 days of returning from OEF/OIF.

### Heterotopic ossification (ICD-9: 728.12, 728.13, 728.19)†

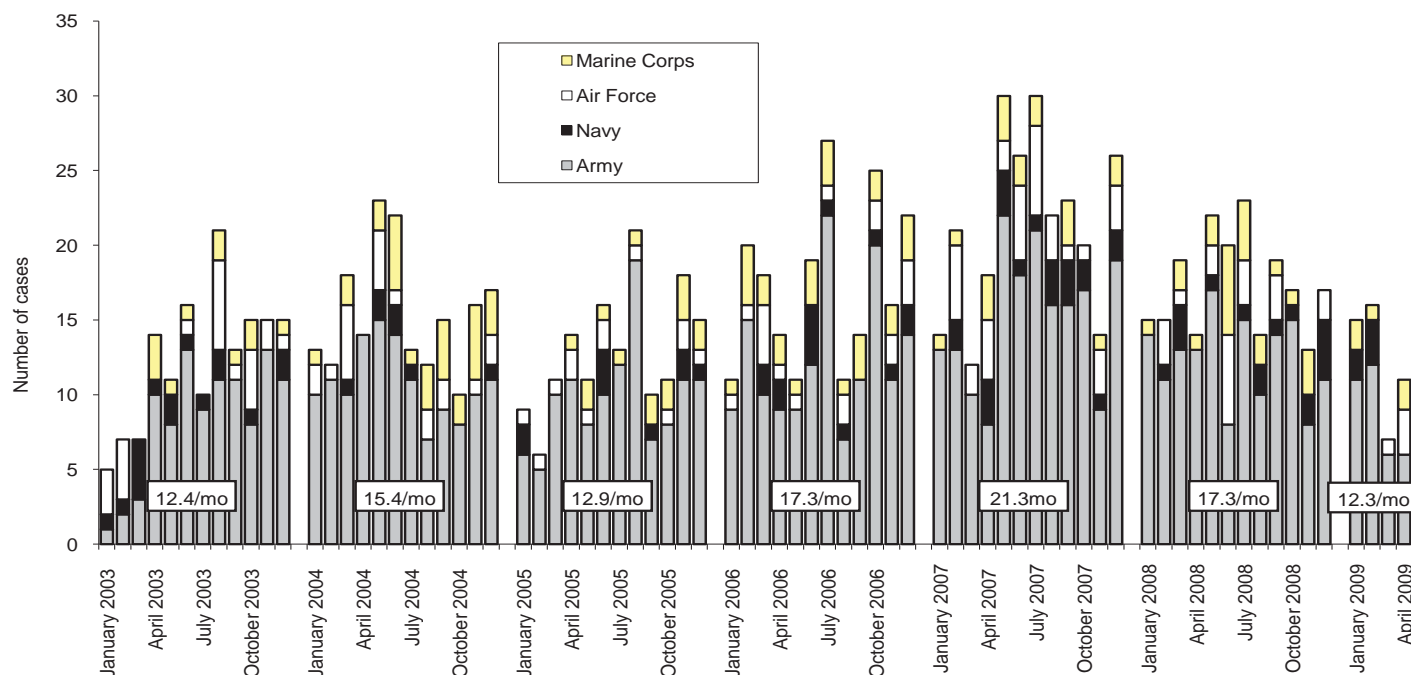


Reference: Army Medical Surveillance Activity. Heterotopic ossification, active components, U.S. Armed Forces, 2002-2007. *MSMR*. Aug 2007; 14(5):7-9.

†One diagnosis during a hospitalization or two or more ambulatory visits at least 7 days apart (one case per individual) while deployed to/within 365 days of returning from OEF/OIF.

## Deployment-related conditions of special surveillance interest, U.S. Armed Forces, by month and service, January 2003 - April 2009 (data as of 27 May 2009)

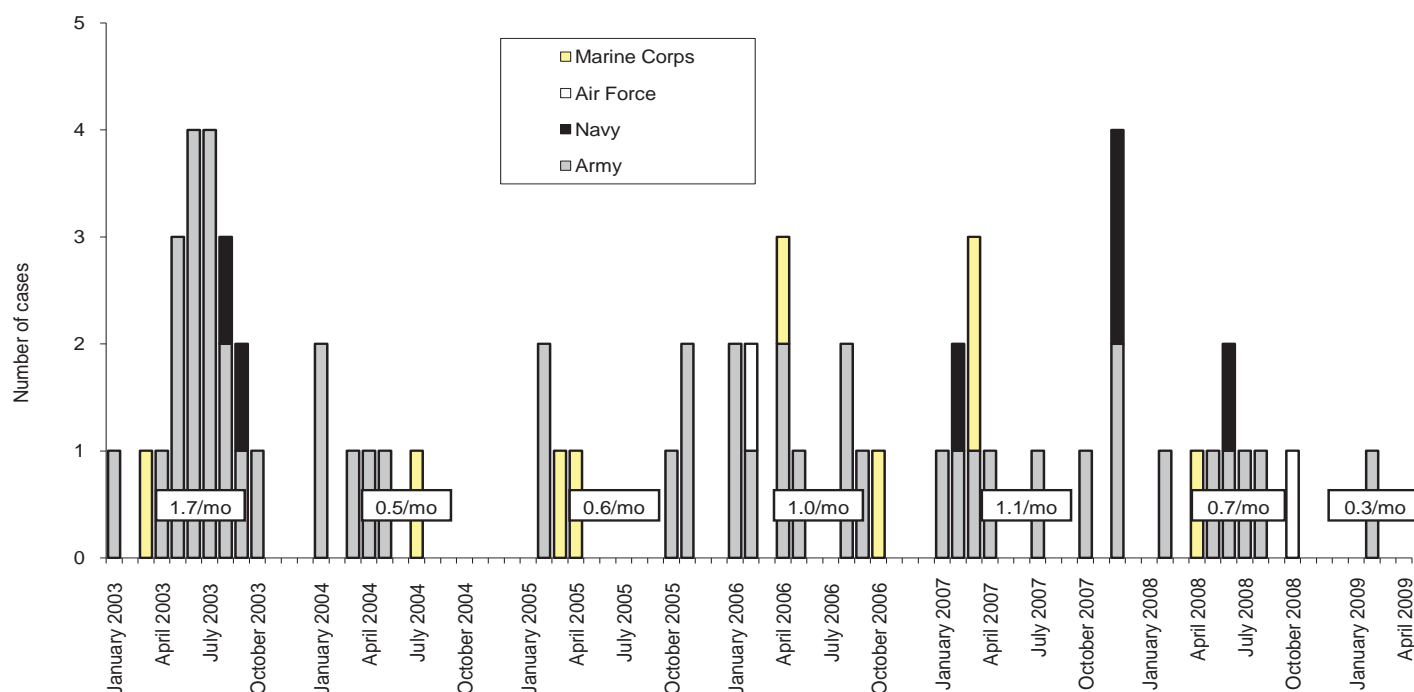
Deep vein thrombophlebitis/pulmonary embolus (ICD-9: 415.1, 451.1, 451.81, 451.83, 451.89, 453.2, 453.40 - 453.42 and 453.8)\*



Reference: Isenbarger DW, Atwood JE, Scott PT, et al. Venous thromboembolism among United States soldiers deployed to Southwest Asia. *Thromb Res.* 2006;117(4):379-83.

\*One diagnosis during a hospitalization or two or more ambulatory visits at least 7 days apart (one case per individual) while deployed to/within 90 days of returning from OEF/OIF.

### Severe acute pneumonia (ICD-9: 518.81, 518.82, 480-487, 786.09)†

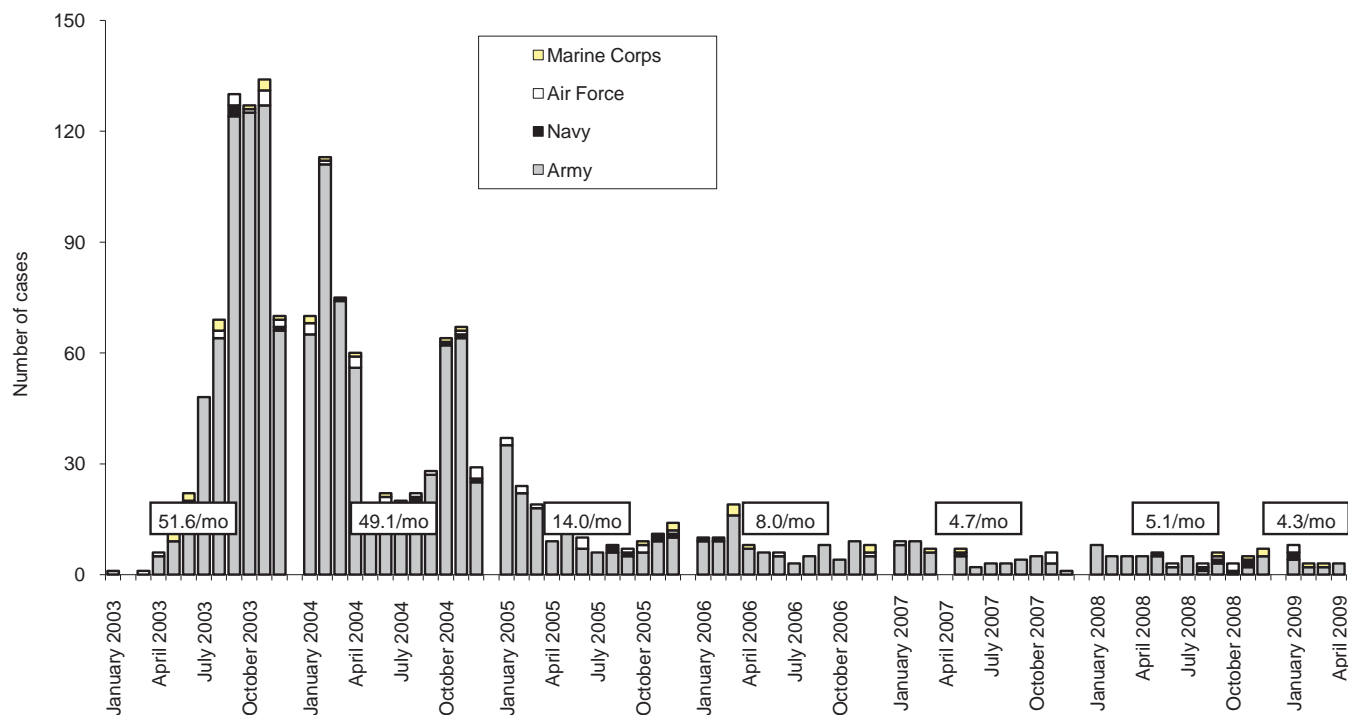


Reference: Army Medical Surveillance Activity. Deployment-related condition of special surveillance interest: severe acute pneumonia. Hospitalizations for acute respiratory failure (ARF)/acute respiratory distress syndrome (ARDS) among participants in Operation Enduring Freedom/Operation Iraqi Freedom, active components, U.S. Armed Forces, January 2003-November 2004. *MSMR.* Nov/Dec 2004;10(6):6-7.

†Indicator diagnosis (one per individual) during a hospitalization while deployed to/within 30 days of returning from OEF/OIF.

## Deployment-related conditions of special surveillance interest, U.S. Armed Forces, by month and service, January 2003 - April 2009 (data as of 27 May 2009)

Leishmaniasis (ICD-9: 085.0 to 085.9)\*



Reference: Army Medical Surveillance Activity. Deployment-related condition of special surveillance interest: leishmaniasis. Leishmaniasis among U.S. Armed Forces, January 2003-November 2004. *MSMR*. Nov/Dec 2004;10(6):2-4.

\*Indicator diagnosis (one per individual) during a hospitalization, ambulatory visit, and/or from a notifiable medical event during/after service in OEF/OIF.



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